~~To Don~~

~~with love~~

George

1955

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HOUSEBUILDING IN TRANSITION

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HOUSEBUILDING IN TRANSITION

Based on Studies in the
San Francisco Bay Area

BY

SHERMAN J. MAISEL

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To the memory of my father

LOUIS MAISEL

Preface

The purpose of this book is explained in chapter 1. As the reader progresses, it will be clear that in order to describe the housebuilding industry to economists and other interested observers, such as materials suppliers, lenders, government personnel, and legislators, I have included descriptions of technical processes which may be basically familiar to builders. I felt it necessary to furnish sufficient technical facts so that students and other readers can understand why certain procedures are employed. At the same time, I felt that these descriptions are also important to builders. An orderly presentation of the actual steps in constructing a house will enable them to reexamine their own operations with a view to improving their methods, by offering an insight into the logic of many procedures that are frequently taken for granted.

Even an abbreviated list of acknowledgments must be long. The basic research for this book was performed under contract (No. O-E-50) with the Administrator, Housing and Home Finance Agency, results of which were submitted in a report dated August 31, 1951. I am particularly indebted to that agency and to the University of California Bureau of Business and Economic Research, which was a joint sponsor of that project. Their staffs, under the direction of Dr. Richard Ratcliff and Dr. Frank Kidner, respectively, aided greatly in the furtherance of this study. Mr. Jack Rogers, my associate in the above project, gave valuable assistance throughout, particularly in connection with the Statistical Appendixes, many of which stand in the approximate form in which he developed them. Mrs. Betty Ballantine Hogan assisted in the writing of the results. Mr. George Pucci, Robert Williams, Wells Keddie, Fred Maisel, Willard Wall, and many others shared in gathering the basic data. Mrs. Jerry Honeywell Hobbs and Mrs. LaVerne Rollin performed the initial editorial and secretarial work.

The complete coöperation of the builders of the Bay area—essential to this first accurate, composite picture of who housebuilders are and

how they operate—was freely accorded. Above all, I am indebted to my wife, Lucy Cowdin Maisel, for aid in a myriad of ways. I have imposed upon her time and good nature for aid and comfort, as well as for a large amount of skilled technical work.

Sherman J. Maisel

University of California
Berkeley, March 1953

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PART I

1

Introduction

This book is aimed at increasing the reader's knowledge and heightening his understanding of the housebuilding industry. New knowledge and better understanding are fundamental to any effort to improve the methods by which houses are produced. Because of the importance of housing to all, and because of general dissatisfaction with the achievements of this industry, interest in the problems of housebuilding is widespread. For these reasons, this book is addressed not alone to specialists with a particular interest in housing, but to a broad range of readers who seek a clearer comprehension of one of the country's most basic industries.

There are various possible paths to improved housebuilding, and the selection of those which may be expected to lead to best results requires accurate information. The lack of valid information in this field is great. Housebuilding, as one of the oldest, largest, most diverse, and most troubled and troublesome of all industries, has been the subject of much writing, especially in recent years; yet facts about how it actually functions, analysis of why it operates as it does, and evaluation of results and of prospects are exceedingly sparse. These gaps in knowledge and understanding, this book attempts to fill.

In assembling the needed information, this study undertakes a threefold approach. A specific description of how houses are built in the San Francisco Bay area is presented to meet the need for facts about what exists; analysis explains why operations take their present form; and evaluation of housebuilders' performance judges the effectiveness of today's results and points toward possibilities for future betterment. This approach makes use of a great many data which illumine the structure of the industry, the interrelationships of the men who

manage it, their methods of production, their products, the results they have achieved, and their expectations.

The desirability of research into the organization and operations of housebuilding is highlighted by the fact that this industry is one of the most important in the nation in terms of dollar volume, employment, and contribution to the nation's wealth, and that from one-fourth to one-sixth of each family's income is spent for shelter. It is evident from either the consumer's or the industrial point of view that any improvements in housebuilding and any reductions in the cost of shelter will raise the general standard of living. In addition, many believe that fluctuations in housing production have been a major factor in introducing and spreading instability throughout the economy. If this is true, knowledge leading to stabilization of housing production would, again, be a prime economic and human benefit.

Knowledge about the housebuilding industry, however, has been too sparse for any effective application. Probably less is known about housebuilding than about any other major industry. Myths, dogmas, and pat solutions of the housing problem have been offered in place of facts.

Existing knowledge in the field is summarized in two excellent, fairly recent works. The first, *American Housing*,[1] a comprehensive survey of known conditions, presents a typical picture of what most people—even experts—believe the industry to be like. The second, *Production of New Housing*,[2] brings together the results of earlier research in housing and analyzes current problems. Both of these works will be referred to throughout this study as reflecting the facts and views about housebuilding that existed when this book was written.

Inadequacies of the state of knowledge are described by Leo Grebler in *Production of New Housing:*

> The student in this field is confronted, in the existing literature, with a great many conflicting assertions, generalizations often drawn from inadequate evidence, *ex parte* statements, and analyses obviously designed to support one kind of public policy or another. He finds few undisputed data and little analysis of a scientific nature.

[1] Miles L. Colean, *American Housing: Problems and Prospects,* (New York: The Twentieth Century Fund, 1947).

[2] Leo Grebler, *Production of New Housing,* (New York: Social Science Research Council, 1950).

> A few examples of the assertions found in the literature will illustrate the point: Housing production is inefficient and uses largely the handicraft methods of a hundred years ago; methods of housing production have changed a great deal and are as efficient as they can be considering the nature of the product and the market. New houses are within the reach of only a small proportion of families in the upper income brackets; new houses are within the reach of a large proportion of families in all but the lowest income groups. The cost of distribution of building materials is excessive; the cost of their distribution is low considering the functions performed in the distribution process. Labor union restrictions are responsible for high costs and impede technical progress; labor unions exercise no restrictions except those dictated by considerations of health and safety and do not stand in the way of progress. The list could be extended indefinitely. There are few observations in this field which may be considered more than untested hypotheses.[3]

No one familiar with the literature can quarrel with this statement. For example, a look at the many congressional investigations into housing makes it evident. Although much time and money have been spent on almost annual hearings, few facts of value have been added since the hearings of the Temporary National Economic Committee in 1939, with the exception of the 1940 Census data. Beliefs and dogmas have been restated in more detailed and sometimes more elegant language, but they still remain untested generalizations. Repetition has won their acceptance as facts.

It is the purpose of this book to cut through outmoded data and to clear at least one corner in this morass of misinformation for inspection of actual facts. Concentration on collecting statistics as complete as possible about the housebuilding industry in one area—the San Francisco Bay area—has made it possible to go to primary sources, the builders themselves, for the basic material. Examination of the structure of the housebuilding industry and the methods of construction employed by it in this area and comparison of the actual facts found with known data in other areas have made possible some evaluation of the importance of many issues under continual discussion.

[3] Grebler, *op. cit.*, p. 2.

Inspection of actual facts is the crux, because understanding of them can improve the performance of the industry. The facts are crucial to management, which requires them for important daily decisions and which all too often makes its decisions without the guidance of the experience of others. Knowledge of how fellow builders solve similar problems can improve day-to-day operations.

The facts are crucial, too, in the formulation of public policy. Questions concerning changes in the policies of government lending agencies, enforcement of antitrust laws, expenditures of public funds, and changes in building codes and zoning ordinances arise every day and need answers. Information required for making wise decisions has, on the whole, been lacking. It is hoped that pragmatic answers may be made possible through some of the information that this book offers, and that, consequently, improvement in public policy decisions will aid the performance of the housebuilding industry.

Beyond advances in knowledge and understanding of the housebuilding industry in general, this study is directed toward the broader target of adding to knowledge of the free enterprise system, of which the housebuilding industry is so competitive a part. Most attention in industry studies has been paid to the workings of oligopolistic industries, with far less heed given to the results obtained in the more competitive sector of the economy. In this time of social and political struggle, when the entire system of competition and free enterprise is under fire, the survival of the system depends upon its capacity for improvement—and its capacity for improvement depends upon better knowledge of the methods by which the competitive system performs, and of its strengths and its weaknesses.

To accumulate all the facts about an industry is a long and complex project. It confronts the investigator with questions such as these: Why is this particular industry characterized by its particular type of behavior? What are the factors in its history, in its markets, in its relationships that cause present results to emerge? What are the best possibilities for its improvement? Can certain basic changes be made that would benefit everyone interested in this industry?

The answers to these questions depend upon many variables. The performance of an industry is composed of many kinds of action taken at all levels. Its factors include the industry's over-all organization, its market structure, its type of products, its method of production, the

entrepreneurs and their organization, the supply of the components of production, and the channels through which they move.

In the gauging of performance, attempts to evaluate the results also raise many questions. What has been the price history of the industry? How do its prices relate to its costs? How do the products rate in terms of quantity, quality, and fulfillment of consumers' needs? What is the optimum size for a plant or firm in this industry? How does its technological progress relate to available potentialities? Are avoidable wastes limiting performance and dissipating results?

In answering these and other questions for the housebuilding industry, this book offers a complete description of structure, organization, and operations, before presenting any analysis and evaluation. The description covers the size, type, and geographical relationships of the firms active in the housebuilding market; the dynamic forces at work, such as changes in demand, changes in population, and changes in financing which have occurred during the past decade; the product itself and what it contains; the background and ability of the men who run the firms; the differences between contractors and merchant builders; the ways of organizing firms in terms of legal structure and of overhead structure; the manner of meeting financing problems and marketing problems; the methods of production and the changes which have developed; and the handling of purchasing, records, and controls.

Because the level of the industry's performance and the price of its product depend to a great extent upon the supply of materials and services, a brief description of some aspects of the industries supplying housebuilders with factors of production is offered.

It is the purpose of these descriptions to show by data what housebuilding is, how it works, what its problems are, what its relationships are, what improvements are being made, and what possible improvements remain to be achieved. The descriptions are based upon data gathered through field research. So far as possible, they are unalloyed with interpretation or opinion.

The second part of the book is based upon these descriptions and upon additional statistics gathered specifically for the purpose of analyzing and evaluating the industry. Here, however, because of a lack of absolute standards of judgment, some admixture of interpretation and opinion is necessary. The analysis and evaluation focus

upon the measurement of efficiency and performance, in the belief that if housebuilding is to be improved and if housebuilding costs are to be brought as low as possible, the industry must use the productive resources available to it as efficiently as possible.

Popular discussions of the problems of housebuilding efficiency have followed three main channels: the rationality or irrationality of the structure of the industry and the methods used by individual firms; the effect of size or scale on the efficiency of production; the wastes and excess costs resulting from restrictive forces outside the building firms.

The first stream of thought holds that housebuilding is industrially retarded, organizationally inefficient, and lags behind other industries in application of machine techniques. The second is similar, adding the belief that efficiency will increase only as the size of firms increases. For example, C. Abrams asserts:

> The housing need will be met neither quantitatively nor qualitatively as long as this little speculative industry continues to block up the flow and hold down the quality of homes for the American people. Greater efficiency would follow if the builder were to set up as a large-scale producer on a parity with the automobile manufacturer.[4]

The third stream of ideas holds that the industry is subject to an unusual number of institutional restraints both from inside and outside. Miles L. Colean lists seven elements exercising influence, each of which seems to operate in its own interest alone and to help inflate production costs.[5]

Because these opinions are so widely held, it was believed worth while to test each a priori hypothesis separately against the available facts and against new information which was developed. At the same time, new hypotheses were formed and tested in conjunction with those that had already gained wide acceptance. All possible sources of information relating to the housebuilding industry in the San Francisco Bay area were examined, new methods and procedures for

[4] C. Abrams, "Housing—The Ever-Recurring Crisis," in (S. Harris, ed.) *Saving American Capitalism,* (New York: Knopf, 1948), p. 185.

[5] Colean, *op. cit.,* pp. 314, 329. For additional analyses, cf. R. U. Ratcliff, *Urban Land Economics,* (New York: McGraw-Hill, 1949), pp. 200–201, 454, 477; "Housing: Puny Giant," *Wall Street Journal,* Oct. 9–20, 1947; U. S. Temporary National Economic Committee, *Toward More Housing,* Monograph No. 8 (Washington: Government Printing Office, 1940), pp. 126–141; G. Greer, "Housing: Let's Not Kid Ourselves," *Survey Graphic,* Vol. XXXVI, No. 9 (September, 1947), 470, 495; "The Industry Capitalism Forgot," *Fortune,* Vol. XXXVI, No. 2 (August, 1947), 66.

gathering data were developed, the collected data were tabulated, and from this reservoir of facts flowed the procedures of description, analysis, and evaluation.

This investigation stressed the gathering of new data through the use of large-scale statistical surveys. It employed the accumulation of a large group of case histories obtained through interviews and site observations. It collected a large amount of cost data so that statistical cost functions could be derived. The investigation was limited to a single metropolitan area so that problems of geographical differences would not arise.

This new information, it is believed, results in a far more accurate description of the industry and its structure and operations than has hitherto been available. It makes possible analysis (based perhaps for the first time on reliable statistics) of the effects of changes in scale, of external restrictions, and of the effect of improvement in techniques and management on efficiency and costs. It enables a more accurate evaluation to be given of how the system is working and of its pressure upon the interests of the public.

From this diagnosis of the industry's condition, it is possible to make some prognoses pertaining to the industry's progress. The first part of the book shows the actual manner in which the housebuilding industry is using its resources, and the second indicates areas in which resources might be used more efficiently. With the reader in possession of all the facts in the existing situation, his coöperation is enlisted for exploration of the realm of what may come in the future. Pertinent policies may be suggested to him which, in the hands of the housebuilder himself or in the hands of the public, might eventuate in the improvement of housebuilding, and, therefore, of the living standards of all Americans.

2

The Housebuilding Industry

Forces Shaping the Industry

A grasp of the general institutional patterns and major forces shaping the industry is essential for a perceptive examination of housebuilding. This study describes and analyzes the structure and organization of the San Francisco Bay area housebuilding industry in 1949 and 1950. Since this was a period of transition, the details of the firms' operations reflect many stages of growth and development. The most important force shaping firms' activities was the tremendous expansion which the industry had just experienced. A huge increase in housing demand had taken place. Pressure for shelter had generated opportunities for dynamic development both of scale of operations and of technology. The rate at which this pressure was assimilated varied from firm to firm but is exhibited in all phases of the industry's structure and operations.

In addition to the acceleration in demand typified by the period, the particular area selected for this study exerted a strong influence on the manner in which builders operated. Every metropolitan area differs somewhat in its background, population, habits, climate, wealth, and institutional composition from every other area. These conditions contribute to the way in which the industry in each area develops.

The forces of growth and the regional characteristics are molders of the type of builders at work as well as of their size and of their product. These influences affect the mode of entrepreneurship, and the degree of initiative, in fact, the builders' ability to plan and control their own future. In addition, they change the fashion of houses produced, in style, materials, price range, and site.

To depict the actual functioning of these forces, the national housing scene will be described in general terms, and the specific features of the Bay area housebuilding industry will be outlined and related to the national scene. From these data, the reader may note the areas in which generalization from the local to the national situation appears possible, as well as areas of probable contrast and conflict. They are offered as a basis for the more intensive descriptions and analyses which follow—a panoramic background for the detailed picture.

Growth in Production

Immense growth nationally in production of housing marked the decade 1940–1949.[1] This vast increase in volume created significant changes in the structure of the housebuilding industry. Of necessity, the forces of growth which were at work throughout the country were exerting their influence on the Bay area.

During this decade, between 8,000,000 and 9,000,000 dwelling units were added to the nation's housing inventory (table 3). Between 6,000,000 and 7,000,000 were newly constructed units, and the rest were conversions and marginal additions to the supply. This record stands in dramatic contrast to the inventory change for the period 1930–1939, when the increase was about 5,000,000 of which 2,730,000 were newly constructed units.[2]

The important story told by these figures is that the rate of building of new dwelling units was approximately 2½ times as rapid in 1940–1949 as in 1930–1939. The same story of increase is told by the figures for the terminal years of the two decades. In 1939, 515,000 dwelling units were started, whereas in 1949 the number was more than 1,025,000.[3] The increase was large both relatively and absolutely.

The gain in production in the 1940's was not spread evenly throughout the period. Under the impetus of the defense economy, large gains in housebuilding had been made in 1940 and 1941, but when the war started, housing was cut back to such a degree that 1944 was one of the lowest years ever recorded. The low level continued until the war ended. Then, of course, there was a tremendous upsurge. In the year 1946, housing production was almost quadrupled. Further gains of

[1] Data used in this section can be found in Appendix B and tables 3 and 4.

[2] Colean, *American Housing*, p. 365; F. W. Dewhurst, *America's Needs and Resources* (New York: Twentieth Century Fund, 1947), p. 142.

[3] *Housing Statistics* (January, 1951), table 23.

10 to 20 per cent were experienced annually through 1949, and another sharp increase amounting to 35 per cent took place in 1950. More than 60 per cent of the decade's new construction was concentrated in the last four years. One striking statistic sums up this production boom: more houses were built in America in the five years from 1946 to 1950 than had been constructed in the entire preceding 15 years (tables 3 and 4).

The production situation in the Bay area was roughly similar to the national picture. The number of dwelling units in the Bay area increased by 247,000 between 1940 and 1950, in contrast with the increase of about 90,000 between 1930 and 1940 (table 3).

In the local situation, however, there was a relatively smaller concentration of building at the end of the decade. Since the Bay area had been a major war production center which had experienced a sudden, massive influx of population, comparatively more emergency housing had been authorized and produced in this locality during the war than elsewhere. For example, 48,000 units, or one-fifth of the total increase in the decade, consisted of public war housing. This was probably the largest concentration of war housing in the country, and its presence diminished the intensity of demand for new housing when the war ended. It must be emphasized that this moderation of demand was strictly relative, since the Bay area's hunger for housing was far from satisfied by war housing projects. Residents of the Bay area were crowded in apartments, living with in-laws, accepting makeshift arrangements, just as were the residents of every other area; and when the pent-up pressure for "a home of one's own" was undammed, the flood of demand for new housing was only slightly less urgent locally than nationally.

The enormous increase in production—when war's end made production possible—to meet the acute demand altered the cost structure as well as the type of markets and the organization of firms. The effect on costs and prices was naturally inflationary. Building cost indexes, which are based on weighted averages of quoted materials, rose by approximately the equivalent of the increases of wholesale prices in general.

The estimated cost of one-family dwelling units actually constructed increased somewhat less than the change shown in the cost indexes. It rose from $4,000 for the average one-family unit in 1939 to $7,625 in

1949, or 90 per cent compared with 108 per cent for the price index.[4] This difference may reflect either a change in size of the units built in the two periods or, perhaps, a change in efficiency.

Even more important than its effect on cost structure was the effect of the increased rate of production on builders' size and methods. What has emerged from the war and postwar periods is the large-scale operative builder. War experience gave the initial impetus to the growth of the big merchant housebuilding firms. Although the war imposed a decrease in the amount of housebuilding, that which did take place was more concentrated among the larger firms than it had been in the past. Builders who could work with government agencies in obtaining permits, priorities, and contracts were able to augment greatly their dimensions of operation. Problems of financing and marketing which had plagued them and kept them small in the prewar period were removed through the receipt of government aid and a ready-made market. Although the war ushered a large number of firms out of the industry through its restrictions and regulations, it abetted the growth of many which were able to hold on. Among the advantages gained by those firms which remained and grew was the opportunity to experiment with new techniques based upon their increased scale. Those who built at all had a ripe market of war housing demand, and, aided by the government, they built on a grand scale.

These advantages were carried over into the postwar period. The initial situation which gave momentum to the growth of the large firms was altered only in degree. A huge backlog of demand, aided and increased by government-guaranteed and insured credit, eliminated most of the prewar marketing and financing problems. The financial position of many firms had improved as a result of the war. They had more capital. The assured market, together with definite government commitments to insure loans on completed houses, greatly eased credit problems. Builders who had been active during the war had gained experience with larger operations and knew the advantages to be gained from increased size as well as the techniques necessary for successful large-scale operations. Other builders observed their success, recognized the new opportunities, and hastened to exploit them.

The structure of the housebuilding industry, as this study found it, manifests all these influences: war-induced growth; a marketing situa-

[4] *Housing Statistics* (January, 1951), tables 3 and 6.

tion rooted in widespread, unsatisfied demand; the stimulus of easy credit. This picture was practically unaltered until 1951. At that point, there was a tightening of credit and some slackening of demand. Since this book is a report on the industry as it existed during 1949 and 1950, the bulk of the text is focused on that period. Only after the status of the industry as it stood at that time has been completely presented do we permit ourselves guesses concerning meanings of changes and their possible indications for the industry's future.

The Area of This Study

The geographical location of the housebuilders described in this study[5] strongly influences their operations. They are all based in the San Francisco–Oakland metropolitan area. The most important aspect of this geographical influence is the fact that these are metropolitan builders. It is clear from an examination of all data that there is a vast difference in the problems of the building industry inside and outside metropolitan areas. Differences in concentration of population, number of units built per year, unionization, codes, traditions, and style of houses, all aggregate to make important organizational and structural variations.

San Francisco is considered typical of the standard metropolitan areas which the government has established throughout the country for statistical purposes. Each of these, by definition, must include at least one city with a population of 50,000 or more. An attempt is made to include in a single area those contiguous counties that are economically and socially integrated. These boundaries are continuously reëxamined in order to make these groupings as currently logical as possible.

The San Francisco–Oakland metropolitan area comprises the counties of San Francisco, San Mateo, Alameda, Contra Costa, Solano, and Marin. The area has 52 building-permit centers, which include most of the incorporated cities and towns, as well as a major center in each county handling all its unincorporated parts. The total land area is 3,300 square miles. Since San Francisco Bay lies in the midst of the area, the total expanse is far larger. Communication difficulties created by the Bay as well as by several mountain ranges have tended to separate some builders into those specializing in the East, West, or

[5] See Appendixes B and F, and tables 3 and 4.

North Bay area. The general homogeneity of the area is sufficient to make these difficulties easily surmountable by the larger operators. The communities' dependence on San Francisco for most services acts as a centralizing factor so that firms desiring to do so can work throughout the area. Such universality is accomplished by many large builders, trade contractors, and suppliers.

The climate is mild, with a mean temperature of 59 degrees. Rainfall varies from 12 to 46 inches a year in different parts of the area, but is almost entirely concentrated in the winter months. More important, as far as building is concerned, is the almost complete absence of freezing and snow. This climatic situation permits a simpler type of construction than is required in regions of rugged weather extremes. Another effect of the temperate climate on building is that outdoor work rarely has to be suspended because of rain, except in the three winter months, and no special heating precautions are required during construction.

The terrain is a hilly one, with few level areas. Three mountain ranges run through the region. These have a Protean influence upon housing, resulting in unique styles of construction in the major cities. Special planning of each house to its own lot is almost a topographical prerequisite in many places. The hilliness tends to limit somewhat the maximum size of tracts, even in the more nearly level areas, and frequently imposes special problems of site planning. As a result, site planning itself is probably more advanced than in most other regions.

The total population of the area on April 1, 1950, was 2,240,000. This represented an increase of 808,000, or 56.4 per cent, in the past decade, compared with an increase of 14.4 for the country as a whole. Although part of this increase resulted from more births than deaths, the principal part of it was due to a heavy immigration (table 3).

The average age in the Bay area is slightly higher than for the country as a whole, whereas the average household size is smaller. Probably more important, as it affects housebuilding, is the generally high level of income. The median family income in 1949 was $3,817, or 17 per cent higher than the national nonfarm average. On the other hand, there is virtually no difference in income when comparison is made with other major metropolitan areas (table 41 and sources cited therein).

This kaleidoscopic glimpse of the Bay area has shown certain local

variations from the national average in design for living. Despite these individual differentiations of the locality, a more careful look at the Bay area housebuilding pattern will show its many similarities to the national average in sizes and types of builders and kinds of units produced.

Types of Builders

Is there such a thing as a housebuilding industry?[6]

Before the industry's structure and organization can be described, the question of whether the housebuilding industry exists as an entity apart from the construction industry as a whole must be answered.

This study takes the position that the housebuilding industry does exist as an entity, separable from general contracting at one extreme, and from owner-builders at the other.

The opposite answer to the question has been given by many previous writers. Miles L. Colean has written:[7]

> In discussing housebuilding, it is necessary to deal largely with the processes required rather than with producing organizations. Centralized producing organizations, combining all or even most of the essential processes, are extremely rare in housebuilding. Ordinarily, housebuilding must be defined as a series of activities that ultimately result in the production of houses. . . .
>
> Basic to centralized control (in other industries) is producer initiative—that is, the determination by the producer of both the quantity and nature of his product in advance of sale. This contrasts with buyer initiative commoner in custom industries like . . . housebuilding.

The survey on which this study is based indicated that housebuilding operations are identifiable as an industry; that in discussing housebuilding it is possible to deal with the producing organizations rather than merely with processes; and that, as will be seen, "producer initiative" is a dominating characteristic of postwar housebuilding comparable with the predetermination of product in other industries. Contrary to previous assumptions[8] that dwellings are not commonly constructed by a special class of producer, and consequent tendencies

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[6] See Appendixes B and C, and tables 6, 9, 10, 13.

[7] Colean, *op. cit.*, pp. 59–60; cf. also Grebler, *Production of New Housing*, p. 6.

[8] Colean, *op. cit.*, p. 63.

to lump together statistics on all types of construction, this research developed the fact that, at least in the Bay area, the overlap between housebuilders and others in the building industry is not great.

In 1949, 90 per cent of the houses built by firms in the Bay area were constructed by businesses which did only housebuilding or received less than 10 per cent of their income from other types of building. Of the remaining 10 per cent of houses, half were built by 200 firms which also did general building, but whose housing volume made up from 60 to 90 per cent of their total. Only the final 5 per cent of the houses were built by general contracting firms which did more work on other types of building than housing. There were 238 of these; but one-third of their production was contributed by two large general contracting firms which also did tract building. These figures are evidence that it is correct to speak of a housebuilding industry as such, though classifying building firms as members or nonmembers of the housebuilding industry on the basis of a set percentage of total volume devoted to housebuilding must be somewhat arbitrary (tables 10 and 15).

The number of general contractors who engaged in housebuilding but whose housing volume made up less than half of their business is too small to affect the picture of the industry as portrayed through statistical surveys. Where their structure is such as to influence the attributes of firms, attention is called to this fact as well as to the manner in which they affect the statistical tables. In effect, they are segregated where necessary, and for purposes of analysis they are not allowed to alter the true picture of housebuilders.

At the opposite end of the scale from general contractors are owner-builders. Housebuilding is an exception among major American industries in that a significant proportion of all houses built in the United States are constructed by individual households or nonprofessionals. The day when families can build their own shelter has not yet passed in this country, frontierlike as that may sound in a machine-age culture. For purposes of industry analysis, it is vital that these individuals be separated from the firms before any statistical measures are derived; otherwise, since their number is so large, it will bias all results and negate most interpretations. Failure to make this separation is the cause of many of the weaknesses in the prewar data of the Bureau of Labor Statistics.[9]

[9] Cf. Grebler, *op. cit.*, p. 6.

In 1949, more than a fourth of all privately financed nonfarm dwellings started in the United States were built by amateurs. These owner-builders numbered 265,600 and built approximately an equivalent number of units, or 33 per cent of all houses constructed. Nationally, owner-builders outnumbered actual building firms by more than two to one (tables 6 and 7).

The prevalence of owner-builders is much greater in nonmetropolitan than in metropolitan areas. Sixty-four per cent of the owner-built units were constructed in the nonmetropolitan areas, whereas these same areas accounted for less than 35 per cent of total housing production. The preponderance of the owner-builder pattern in the country, rather than the city, is illustrated by the fact that in nonmetropolitan areas 60 per cent of the houses are built by owner-builders; in metropolitan areas only 18 per cent are put up by owner-builders.

In the metropolitan areas, there were 96,000 nonprofessional builders. This means that there were nearly one and one-half times as many amateur builders as there were active firms in these areas, although the amateurs accounted for less than one-fifth of the total units produced.

The figures for the San Francisco Bay area resemble the average of other metropolitan areas. There were 2,002 nonprofessionals, compared with 1,658 firms which completed houses in 1949. These individuals exceeded the number of firms by 22 per cent and actually accounted for about 11 per cent of all residences constructed.

In the Bay area, two-thirds of these "homemade" houses were built by people with no relation to the industry whatsoever. They were primarily amateurs who read a book or had a friend with some experience and set out to build their own homes. The remainder of these houses were built by craftsmen whose jobs and skills were related to the industry—maintenance carpenters, building inspectors, or mechanics working for others, who frequently used their own time to build for themselves.

Usually individuals built in their leisure hours—week ends, vacations, or after work. Six per cent, however, put in full time on the job. Most of the nonprofessionals did a large part of the basic work, assisted by their families and friends, but they subcontracted plumbing, electrical work, and sometimes other specialties. In 12 per cent of

the cases, they merely acted as general contractor and supervisor, hiring carpenters, subcontractors and laborers.

Although a significant segment of the nation's housing demand is supplied by individuals, these amateurs ordinarily appear in the market only once in their lifetimes. They are not part of the actual industrial process. Their problems differ greatly in kind and degree from the problems of members of the industry. For the remainder of our discussion, our references are only to those firms building houses as a business.

In turning from general contractors, on the one hand, and owner-builders, on the other, to the housebuilding industry as an entity, we find that professional housebuilding firms are divided into two principal types—the contractor and the merchant or operative builder. The distinction between these two types of operation is as essential to a study of the housebuilding industry as is the separation from it of owner-builders and the segregation of general contractors. In the public mind, the small housing contractor is the symbol of the housebuilder. He is the man who builds on a lot which the owner has bought, builds to a design which the owner has selected, accepts payments for his work as it is installed in the house, and risks very little in terms of decisions or capital. The public has given comparatively little thought to the merchant builder who acquires the site, determines the design, puts out his own money as the work progresses, and assumes the risk of losing his entire investment if the house does not sell.

Many who have studied the contractual relationships which exist between the contractor and the owner of a house have believed that the housebuilding industry has been afflicted with undermanagement because too many functions and controls remain in the hands of the owner. But these criticisms clearly need not apply to the merchant or operative builder, who does make all necessary decisions and offers a completed product to the final purchaser. The dependency in functions represented by the contractor, as contrasted with the independency in functions of the operative builder, has prompted a number of housing critics to generalize that the industry would necessarily remain inefficient as long as it remained influenced by custom building, and progress could take place only with a shift to merchant building.

If these generalizations are at all accurate, the stage has certainly been set for progress. New statistics indicate that the shift has occurred.

In the Bay area and throughout the country, the majority of houses built by firms are constructed by merchant builders. In 1949 merchant builders constructed 71 per cent of houses built by firms nationally, 75 per cent of houses built by firms in the nation's metropolitan areas, and 78 per cent in the Bay area (table 9). These are the firms, determining the nature and quantity of their product in advance of sale, which are increasing in number and increasing in size. Although yesterday belonged to the contractor, this study shows that the contractor is not growing; that the merchant builder, taking advantage of today's techniques in mass production and mass merchandising, is moving in on tomorrow.

Size of Builders

When housebuilders are examined as to number and classified as to size,[10] two striking facts stand out: first, the large number of active housebuilding firms and their wide diversity of size and type; second, the importance in production of medium- and large-sized firms, particularly in contrast with previous experience.

The number of firms signifies the ease of entry into the industry and is an important determinant of its flexibility and its profit structure. The increased prominence of the larger-scale producers signifies a change in the structure of the industry which has greatly influenced all methods, techniques, and operations in housebuilding.

The Bureau of Labor Statistics estimates that there were 119,600 active housebuilding firms in the United States in 1949. These firms constructed 540,000 dwelling units, or an average of approximately five each.

In the Bay area, 1,658 firms built 17,485 houses in 1949, or an average of more than 10 each (tables 7 and 8). For purposes of analysis, some basis of classification of these firms is necessary, since the organization and functioning of each cannot be discussed individually.

Before our surveys, there was no existent information and no ready-made system of classification. Therefore, in the course of our field research, we tried various classifications in order to find a method of presentation which would bring out significant differences most vividly. The most satisfactory system seemed to be that based upon size.

[10] See Appendixes B and C, and tables 5–10, 13, 14.

Having determined to use size as a method of classification, we still had various possibilities of definition. Familiar studies in other areas classify size of firms by value of production, by value of assets, by number of employees, or, after Sombart, by type of management. Besides these categories, in many previous studies of housebuilding the method of size classification used was that of the number of units produced in a given year.

Fortunately, the degree of correlation among these various methods is so high that choosing any one will give results varying only slightly from any of the others.

A firm can be defined as small if it builds between one and 24 houses per year, does less than $200,000 in total volume of business, employs fewer than 10 men, has less than $100,000 in total assets, or is owned and managed by a craftsman who spends most of his time actually working on the job.

A firm can be defined as medium-sized if it builds between 25 and 99 units a year, does between $200,000 and $1,000,000 in business, hires between 10 and 99 employees, has from $100,000 to $600,000 in total assets, and is owned and managed by an executive who has little or no staff and performs almost all overhead work himself, while also spending a good deal of his time on actual job supervision.

A firm can be defined as large if it completes 100 or more houses a year, has a volume of business of more than $1,000,000, hires 100 or more employees, has more than $600,000 in total assets, and maintains a large overhead staff.

Variations in one or two of these attributes do occur, but they are unusual, and often reflect a condition external to the organic situation under study—the firm may conduct other businesses in addition to housebuilding; or on the day when it reported, its functioning may have been atypical because it was working at less or more than its normal rate.

In order to maintain a constant category throughout this study, we have classified all firms by the number of houses completed in 1949. This measure was readily available in all cases and appeared to have fewer ambiguities than other means. At the same time, as has been mentioned, it is highly correlated to the other criteria of size most frequently employed.

For most purposes, we designate firms as small, medium, or large,

according to whether they completed between one and 24 houses, between 25 and 99, or more than 100, in 1949.

It is necessarily somewhat arbitrary to draw a sharp line between these groups. The transition in type of organization is gradual. In some cases, firms close to each other in size but placed in separate statistical classes by our arbitrary division, may actually be more alike in type of organization than are firms lying at the far extremes within a given class. Certain kinds of overlap cannot be avoided. The important point is that when firms are divided according to the number of completions, there occur significant differences between classes which are more meaningful than the differences existing within a class.

When size differences within a class alter organizations, or when other attributes become important, these facts will be given. For example, we subdivide small firms into two classes—those building less than 10 houses a year, and those building from 10 to 24—when the variations of a particular characteristic are so great over the whole range of these firms that lumping the firms together gives a meaningless average. Similarly, in discussing certain characteristics of small firms, we divide the firms into categories of merchant builders and contract builders, because these two builder types differ significantly in certain functions. The purpose of our system of classification and of our interpretations of statistical results has been to bring to the reader as meaningful a picture as possible.

Using this system of classification, we find that of the 119,600 housebuilders in the United States in 1949, more than 115,000 were small, and less than 4 per cent of all housebuilding firms were in the medium-sized or large classifications. There were only 720 large builders, and 3,030 medium-sized firms. Despite this discrepancy in number, the medium-sized and large groups of firms accounted for 45 per cent of the units built by firms. Large builders constructed 24 per cent of the 540,000 units; medium-sized firms built 21 per cent (tables 7 and 8).

These figures represent a dynamic increase in the number of units built by larger firms as well as in the number of large firms in the market since the war. It is clear that an important increase in the concentration of production among the larger firms has occurred, though its exact magnitude cannot be measured because of the lack of comprehensive statistical information for the prewar period.

Prewar data on number and size of housebuilding firms are ex-

tremely sketchy. In fact, only our recent increase in knowledge makes it possible to select among the prewar figures with any confidence that we are obtaining a true picture. A statistical description of the prewar industry requires selecting data from several sources. As a result we can be certain only that it is relatively accurate. We cannot depend upon specific individual figures.

We estimate that in 1939 there were only about 90 to 110 large builders (that is, who started more than 100 houses a year) and only about 400 to 600 medium-sized builders (that is, who constructed between 25 and 99 units a year) (table 5). The large builders started from 15,000 to 18,000 units in 1939, and the medium-sized from 18,000 to 27,000. These represent less than one-tenth of all units (including owner-built) constructed in 1939, compared with the large and medium builders' 1949 percentage of nearly one-third. The large- and medium-sized builders constructed less than one-fifth of the houses started by firms in 1939, compared with nearly half of those started by firms in 1949. The total number of units built by large- and medium-sized firms was at least six times as great in 1949 as in 1939. These figures dramatize both the increase in total production and the increase in the number of larger firms. Both the relative and the absolute changes are striking in the nation as a whole.

The increased importance of large firms is even more impressive when we examine metropolitan areas and the San Francisco Bay district, since it is the less-populated regions which contain the bulk of owner-builders and the metropolitan areas where the larger firms are located. There are no large builders in the sparsely habitated, nonmetropolitan areas, and only about 6 per cent of the new units in these places are constructed by medium-sized builders. In the limited markets of small towns it is difficult for large builders to arise, because the necessary output for their scale of operations would exceed the total demand of the local markets.

Approximately two-thirds of all houses started in 1949 were built in metropolitan areas. Included were nearly 80 per cent or 429,000 units of the national total constructed by firms. At the same time, the number of firms active in these areas was only 66,000, or about 55 per cent of the national total. Metropolitan firms built an average of about seven houses each. The large firms built 31 per cent and the medium-sized firms built 25 per cent, whereas the 95 per cent of the firms which

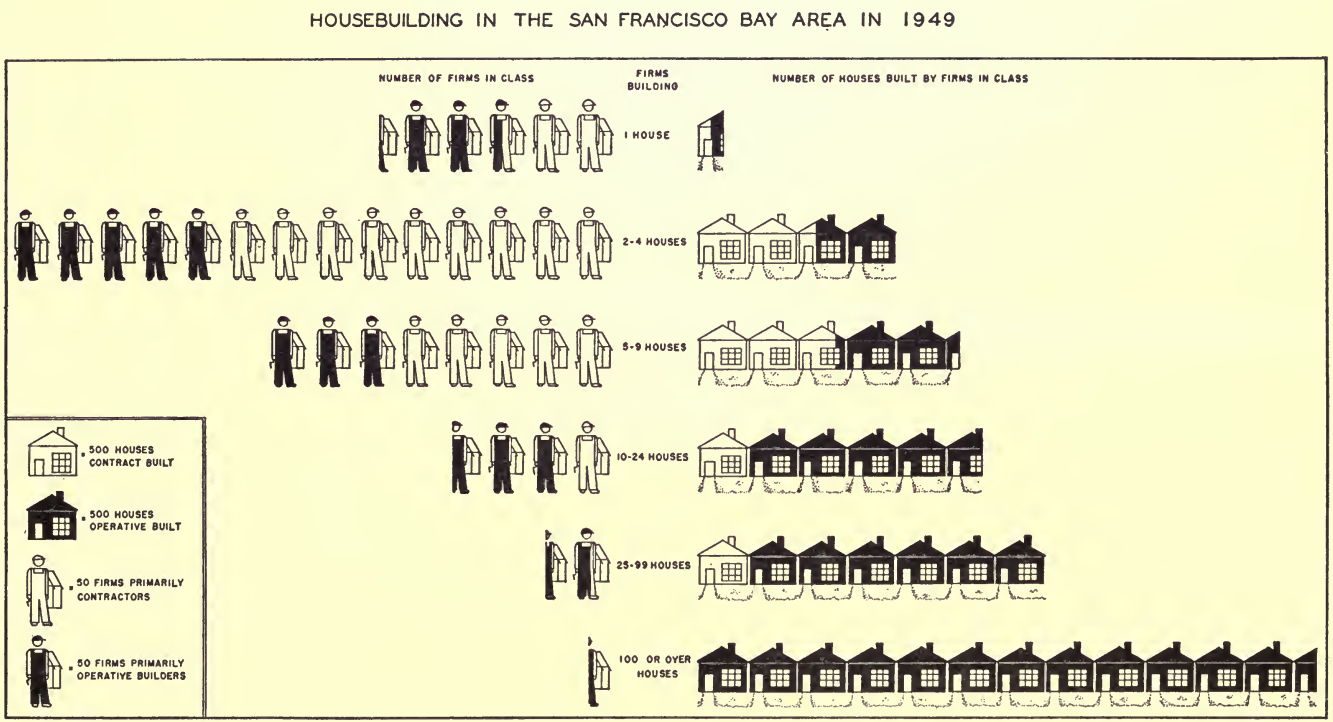

Fig. 1. Housebuilding in the San Francisco Bay area in 1949.

built less than 25 units each in the year accounted for only 44 per cent of the houses that were professionally constructed in metropolitan areas (tables 7 and 8).

The story for the San Francisco Bay area is similar to that of the other metropolitan regions. A graphic picture of the Bay area situation is presented in figure 1. In 1949, there were 1,658 firms in the area building houses. These firms completed 17,485 structures in that year. Divided by size, there were 30 large firms, 77 in the medium classification, and 1,551 small builders. In other words, 2 per cent were large firms, 5 per cent were medium-sized, and 93 per cent were small, compared with the national averages in metropolitan areas of 1 per cent large firms, 4 per cent medium-sized firms, and about 95 per cent small firms.

Large and medium firms together accounted for 55 per cent of the houses produced by firms. The breakdown was 35 per cent for the large firms and 20 for the medium (tables 8, 9, and 10).

In metropolitan districts throughout the nation, as well as in the Bay area, it was the medium-sized firm which built the average or median house—that is, the house which is found midway through a table cumulating units completed, according to builders' size. In the Bay area, the median house was built by a firm which constructed 40 other units in the same year, whereas in most other metropolitan areas the median house was built by a slightly larger producer. This means that in 1949 the odds were even that anyone buying a house from a metropolitan housebuilder purchased from a firm which had constructed close to 50 other houses (table 8).

A similar picture is received if one compares present data with the prewar permit surveys of the Bureau of Labor Statistics, which have usually been quoted as among the best estimates of the sizes of housebuilding firms. Again, one finds the relationship between the two periods to be comparable both on the national and the Bay area levels. The average number of completions per builder in 1938 was estimated at 2.2 nationally, and at 4 houses per Bay area builder.[11]

Omitting the builders of single houses to correct roughly for individuals—not enterprises—included in the 1938 study, the averages would be 4.8 per builder nationally, and 7.6 for the Bay area builder

[11] "Builders of 1-Family Houses in 72 Cities," U. S. Dept. of Labor, *Monthly Labor Review* (September, 1940), "Operations of Urban Home Builders," *Monthly Labor Review* (May, 1941).

in 1938, as compared with averages of 10 nationally and 12.4 for the Bay area in 1949.

When changes in inequality of production between 1938 and 1949 are compared, it is found that inequality has increased. In 1949, builders of more than 100 houses accounted for more than 35 per cent of completions in the Bay area and for 24 per cent of completions throughout the country, in contrast with 16 per cent for Bay area firms of this size shown by the permit data in 1938 and with less than 5 per cent for the large firms in the 1938 national total.[12] These firms which have increased in number and in size are operative or merchant builders in type.

A high correlation between size of firm and type of building was found by our survey. At one extreme, the firms which completed more than 100 houses per year did about 1 per cent of their work on contracts, or about 99 per cent of their work operatively, and only 5 per cent of their houses were not in tracts. At the other extreme, the firms which completed fewer than 10 houses per year did more than 55 per cent of their construction on contracts, and almost all their houses were built on individual lots (tables 10, 13, and 14).

The correlation of size and type of builder is illustrated by the fact that 78 per cent of the units constructed by firms in the Bay area in 1949 were operatively built, with 56 per cent of professionally built units constructed in tracts. This is indicative of the greater importance of larger firms in the building industry. Conversely, the diminished importance of the smallest firms is shown by the fact that only 22 per cent of the Bay area units completed by firms in 1949 were done on contract, principally on individual lots, compared with more than 50 per cent in 1938.[13]

House Characteristics

A final important force in forming the housebuilding industry's organization is the house itself. In fact, the prevalent size and type of builder and the type of house produced are interrelated factors influencing each other as well as the structure of the industry. The predominance of large merchant builders throughout metropolitan areas means that a large number of units produced tends to acquire a uni-

[12] "Builders of 1-Family Houses in 72 Cities," *loc. cit.*, pp. 6–8.

[13] "Operations of Urban Home Builders," *loc. cit.*

form style, often called the "builder's house," and, in its more mundane aspects, nicknamed the "GI house." Certain information on characteristics of houses started during the last half of 1949 was gathered in 15 metropolitan areas by the BLS and was expanded for the San Francisco area as part of the research for this study.[14]

This information makes it apparent, again, that the San Francisco area is typical in the kinds of units being produced by merchant builders, though its climate is more temperate than the average, and its local tradition prompts a few unusual and often more expensive features than are found elsewhere.

The typical Bay area house built in 1949 was a one-story detached unit with garage, having five rooms with an area of 1,010 square feet. It had a median price of $10,750. Although the house was built in the rural nonfarm or suburban areas, in 97 per cent of the cases it had both a community water supply and a community sewer system. It was almost always a frame house. Forty-three times out of a hundred this house had a stucco exterior and was often sheathed only with wire and building paper. When it was not stucco, the exterior was usually redwood siding or shingles. In 83 per cent of the houses, dry walls were used. Sixty-eight per cent had only a floor or wall furnace, rather than central heating. A similar percentage had a fireplace (tables 36, 38, and 39).

Most of these features are typical of all metropolitan houses. Certain characteristics, chiefly related to climate, make Bay area houses simpler than most others. Because of the mild climate, the percentage of houses without central heating and without a basement or utility room is far higher than the national average. For the same reason, the percentage of Bay area houses containing masonry walls or plaster is much lower than the national average. Nevertheless, the Bay area is closer to the national average in all of these features than are Southern or some other Western cities.

Other characteristics related to the pattern of life and local tradition make the Bay area house more expensive than others. Almost every house has a garage or carport; this is true only of about half the typical houses in other areas. More than two-thirds of the Bay area houses have fireplaces, whereas less than half as many, on the national average, have them. Bay area houses are larger than those in nearly all

[14] See Appendix F.

other areas. Of the 15 metropolitan areas studied for the last half of 1949, the Bay area was found to have the second largest average house. The Bay area house was about 13 per cent or 120 square feet larger than the median house of the other cities. All this added up—perhaps together with differences in wage rates or efficiency—to a $1,100 difference in the mean price of the Bay area house over the average of the other areas. The Bay area ranked fourth from the top of the 15 metropolitan areas in price of units built, surpassed only by Cleveland, Chicago, and Washington. This same general type of cost relationship for the Bay area has existed throughout the postwar period (table 36).

Consideration of the kinds of houses also discloses that many features of the houses produced in the Bay area vary with the size of firm producing them. These facts are significant in that they show that in 1949 builders of different sizes were not primarily competing with each other, but were fulfilling the needs of rather distinct and separate markets.

Small builders, who do the bulk of custom work, erected houses with more space, more expensive details, and almost certainly finer quality. Proportionately more houses constructed by small builders have basements or utility rooms, central heat, extra bathrooms, and costlier surfacing for both the exterior and interior walls than do the houses built by the medium-sized and large firms. All these features indicate greater value in the house of the small-sized group of firms.

These small firms produce houses on contract for a small, select market which can afford, and usually demands, many special services. It is a custom market which parallels the high-priced custom market in many other commodities, in contrast with the cheaper, mass production market (table 38).

Bay area builders of more than 100 houses sold about 47 per cent of their total production for less than $9,000. More than two-thirds of their houses were priced under the general average. The median-priced house sold by the smallest builders—of less than 10 houses—cost $13,000, with nearly 40 per cent of this group's production reaching more than $15,000. Remembering that the median house among all groups sold for $10,750, it is possible to conclude that the concentration of the large producers is in the mass market, whereas the smaller the builder, the more expensive a house he is likely to produce, and the more select his market (table 39).

A similar relationship exists with respect to type of land and area in which the various sizes and types of builders work and corroborates the conclusion about the separateness of the markets served by the various size-classes of builders.

The large-scale builder, interested principally in large expanses of relatively cheap land for tract development, must go outside the cities to obtain it. The percentage of small firms building primarily in the central cities is three times as high as the percentage of large firms. When the small builder utilizes land in built-up areas, he is not competing with the large firm at all, but actually is dealing in an entirely different product in a separate market.

The relationship between size of builder and type of land area is reiterated by the relationship between type of land area and price of house. For example, 40 per cent of the houses built by firms in the nonurban sections of the Bay area sold for less than $9,000. Only 24 per cent of the houses built in incorporated areas with less than 50,000 population sold for less than $9,000. Only 5 per cent of the houses built in the central cities sold for less than $9,000.

The interrelationships just observed among size of builder, area and market, and price may be an important explanation of the increased movement of population outside the city. Much attention has been paid to signs of this population movement throughout the nation. In the central cities of the Bay area, one new house was completed in 1949 for every 464 persons; one new house was built for every 62 persons in the suburbs; and there was a new house for every 49 persons in the nonincorporated areas. This shows that the rate of building outside the central cities is more than seven times as great as inside. These results of our survey confirm the preliminary census reports of the movement of population from the central cities to the suburbs, nationally, and underscore the conformity of what is happening in the Bay area to what is happening in the rest of the nation.

Because of this conformity, observable in many aspects of the housebuilding situation, some readers may find certain Bay area data offered by this study useful for reckonings about the industry as a whole.

This study confines itself, for the next three chapters, to an examination of the Bay area housebuilding industry in terms of size of builders. The high intercorrelation between number of units produced and all other measures of size makes unit production a workable criterion;

and the high intercorrelation between size of builders and all other factors involved in housebuilding makes size a usable statistical lens for X-raying the structure and organization of the industry. The following chapters present, in order, the small builder, the medium-sized builder, and the big builder in three statistical profiles describing the problems and solutions of each in respect to typical background, organization, financing, market, production, labor relations, purchasing, and controls.

It should be emphasized that though these facts are presented in narrative form, they are based on a statistically reliable survey of the entire housebuilding industry in the Bay area. The description of methods and organization of each size of firm is based upon case studies and interviews. The statistical appendix describes in more detail the methods used in these case studies. It also presents tables that enable the reader to estimate the reliability of each statement (tables 1 and 2).

3

The Small Builder

Although their role has decreased, small firms continue to play an important part in the housebuilding industry.[1] Their chief characteristics are simplicity, flexibility, and direct control over their workers and subcontractors, with resulting advantages inherent in personal relations. Although extremely elementary, their organization in relation to their labor supply, trade contractors, and materials distributors is sensible and properly performs the functions required of it. As with many informal organizations, theirs has far greater efficiency and stability than is commonly recognized.

Because of their small scale, these firms cannot adopt many of the cost-saving procedures of the other classes. However, much of their relative inefficiency in purchasing and in the use of major factors required for production is compensated by low charges for profits and overhead. Because of their simple form, they operate without exact records and cost information, but thus far their techniques of control have been fairly adequate for the demands placed upon them.

Opportunities for research and development of new procedures are practically nonexistent for small firms, but they contribute to the industry's progress by building experimental units and those of new design created by architects. In the postwar period they have adopted many new techniques rapidly. They also fill an important role as custom builders who furnish for upper-income groups better quality houses on scattered sites. Unlike larger firms, they can produce individual units in any location without further loss of efficiency.

These firms exist for personal and historical reasons, not because they are particularly efficient. Although it is possible that some are

[1] See Appendix C, and tables 10, 11, 13, 18, 39.

founded with hopes of winning in the grand lottery and of becoming the rich successful firms of the future, most reflect, rather, their owner's desire for independence and self-employment. These firms used to be dominant in the building industry. They still are, in terms of number, but not in actual production.

Small firms are those which build between one and 24 houses in a single year. Their total sales are less than $200,000. They are the firms usually owned by former carpenters who still work on the job as foremen and are their own best workmen. Only toward the top of this bracket do the owners spend their full time in direct supervision. A majority of these firms are contractors, but among them are some small operative builders, constructing individual houses primarily on a speculative basis.

There were 1,551 small housebuilding firms (93 per cent of the total) active in the Bay area in 1949. They produced 7,778 dwelling units (45 per cent of the total), or an average of five units per firm. Their distribution by size was J-shaped, with the largest number of firms those which completed only one house in the year. For many of the firms included in the small-sized classification, housebuilding was either a secondary interest, or the firm spent only part of the year in building (tables 10, 15, 16, and 18).

Among them were general contractors who received most or a sizable percentage of their incomes from constructing buildings other than houses. In addition, some firms had incomes from real estate or land development activities. More than half the firms in the small classification were in business only part of the year (nine months or less). If a firm builds during only part of the year, size when measured by yearly volume is obviously smaller than its monthly rate of construction. The net effect of all these factors is that measuring by completions understates somewhat the actual size of the firms. The firms in business for only part of the year reflect the rapid rate of turnover of housebuilding firms. Housing has had a larger percentage of turnover than any industry in most postwar years. Turnover in building is due not only to the attrition normal in all industries through death, sickness, failure, and so on, but also to the fact that low capital requirements induce many mechanics to set up their own enterprise when a favorable contract or speculation is available and then allow it to fall into disuse until the next advantageous opportunity arises.

The interaction of these various factors is apparent. Only 16 of 270 firms completing a single house reported that they were in business for the entire year and did not have income from other types of building. The other firms which did no other building were in existence six months or less. Within the whole group of firms falling in the 1–9 unit bracket, only 340, or one-fourth of the total, reported that they did only housebuilding and were in business for the complete twelve months (table 18 and Appendix C).

Since important managerial changes take place at around the ten-unit-per-year level, it is logical for many purposes to subdivide small builders into two homogeneous classes. First, there were 1,362 firms which completed less than ten houses in the year. Together they built 4,842 units. In this smallest-size bracket, 424 of the firms were primarily operative builders, 716 were primarily contract housebuilders, and 222 were general contractors who built some houses but did more of their work on other types of buildings. These last two categories, containing nearly 70 per cent of the total, conformed to the usual picture of the traditional housebuilder as a small firm working primarily on contracts from the plans of others. As firms expanded into the 10–24 classification, their methods of operation began to change. In this second group of 188 firms, 132 were operative housebuilders whereas the remaining 56 did most of their work on contracts. Together they completed 2,936 units (tables 11, 13, and 15).

As mentioned previously, the custom houses produced by small builders contained more space and had more expensive features than those built by larger builders. The median house produced by this group cost $12,400 as compared with a median of approximately $9,800 for the larger firms. Perhaps more important, more than 40 per cent of the units built by firms completing less than ten per year and 20 per cent of the units built by those in the 10–24 classification cost more than $15,000. This compares with a total of less than 9 per cent of expensive houses constructed by medium and large firms (table 39).

Background and Organization

Small builders operate in the craft tradition. The average owner had 14 years of building experience, principally as a carpenter working for others, before he started his present firm. Most firms have been founded since the war—only one-fourth date from the prewar period.

The recent tremendous expansion of demand, the availability of somewhat simpler financing, and increases in their own capital resulting from the general prosperity allowed these men to leave their employers and branch out on their own.[2]

With a median age of four years, firms in this class are somewhat younger than are those of the larger groups. So, also, are their owners, despite a long background in building. Owners of the firms in the 1–9 classification have a median age of 43, and those in the 10–24 group average 48 (tables 24 and 25).

Among the youngest of the new owners is a sprinkling of non-mechanics who have established housebuilding firms since the war. Not being tradition-bound, they have hoped to improve the industry through the introduction of new techniques and ideas. This younger group includes some recent college graduates and a small percentage of men from other industries. (Seven per cent of small builders are college graduates and 9 per cent did not start as mechanics.) Still, the great majority of owners have spent all their time in building, most of it in working for others.

Small size is a matter of choice for many of these firms. Their owners have no wish to pyramid themselves into great or powerful enterprises. Their thinking and planning is on a small scale. They take pride in their craft and like housebuilding. They enjoy working with tools and materials and are satisfied with their existing size and independence from worry and stress.

The organization of these firms, in their executive and management functions and their legal form, remains as simple as possible. Unincorporated proprietorships predominate in the smallest-size group, with 904 firms, or 66 per cent of the total, in this category. Next most important are partnerships, totaling nearly one-quarter of the firms. The prevalence of partnerships is a striking feature of the building industry, noticeable at all size levels. Apparently, partnerships are a particularly logical form of structure. Duties and responsibilities of ownership are diverse and can be split rather simply. At the same time, partnerships increase the possibility of raising capital, and some such increase over individual holdings is necessary for growth. Finally, fewer than 100 firms building less than 10 units per year are corporations, and these frequently are general contractors for whom housebuilding is of minor importance. As would be expected in small firms,

[2] See Appendixes C and E, and tables 21, 24–35.

few intercorporate relationships exist. The only exceptions are those firms established as housebuilding affiliates of a real estate business (table 27).

The executive functions of small firms remain uncomplicated also. In 76 per cent, or more than 1,000 firms, the owner is a working foreman spending six to seven hours each day on the job as a carpenter and foreman. The owner uses the remainder of the construction period, hours after work, and some time in the evening in record-keeping, searching out and negotiating with subcontractors, and handling other overhead details. Although in some small firms a part-time bookkeeper or secretary may be regularly employed, frequently either the owner or his wife does all the bookkeeping and secretarial work (table 20 and Appendix D).

In most of these firms, the owner's home is his office. In many cases, the only cash payments for overhead personnel go to an accountant or bookkeeper, who checks the books and prepares the tax records on a fee basis.

In 24 per cent of the firms completing less than ten houses per year, the owner acts as a full-time executive rather than as working foreman. In these firms, the builder usually either has other interests, such as real estate, which occupy part of his time and furnish him additional income, or he is a contract builder working on expensive units. In the latter instances, more time must be spent in obtaining bids and in negotiating with owners or architects, and the higher price of the units includes the necessary payments for this additional overhead.

This lack of a complicated overhead structure is simultaneously the source of greatest strength and greatest weakness of these firms. The strength exists because only extremely low overhead charges need enter into the price of their houses. The weaknesses lie in the fact that the management effort and skills bestowed on these firms are also minimal.

Firms must add overhead to their direct costs. It includes all costs of supervision above the level of working foreman, all office expenses, depreciation of equipment, selling costs, rent, and the cost of capital not borrowed specifically for the construction of a particular house. Because of the great difficulty of separating on an economic basis profits and overhead in these firms, both returns are considered together.

How large is each main component of overhead in a small firm? A very simple estimate can be made for those 900 firms in which the proprietor is a working foreman who performs management functions in his spare time. Such firms have no off-site employees; the owner or his wife handles the paper work. They pay no rent for their office, which is usually the dining-room table. In these firms, which are unincorporated, the cost of supervision, the return on capital (which is primarily working capital), and the owner's wages as foreman are lumped together. This total sum was estimated from financial records of the builders (Appendix E). In this estimate it was assumed that the first $5,000 of the proprietor's income covers his wages as a working foreman. In reality, this is somewhat less than he would have received in wages if he had been a foreman working for another firm.

According to the builders' financial records, the median small builder (1–9 units) received $2,800 above his estimated salary. (In partnerships, estimates are after their joint salaries have been withdrawn, and in the few corporations, after all expenses.) This net profit before taxes averaged approximately 5.7 per cent per dollar of sales. It was a return of approximately 13 per cent per annum on the net worth which the builder risked in his operations (tables 33–35).

This so-called net profit had to cover both the necessary return for the risk of the builder's investment and any cash compensation for the many extra hours he and his wife put in on management functions. In reality, since it was only about half the rate of return received by those who had invested in larger building corporations, it may not have been even a normal return on capital.

The small builder was getting little or no compensation for the time spent in managerial and overhead functions. He was paid for his actual labor as a carpenter foreman and for the use of his equity, but that was all. All his executive work was a labor of love. The cost for management in small firms was approximately zero.

Many feel that there is something basically wrong in this situation. The builder spends ten to twenty hours of his free time in overhead functions, and certain observers believe, therefore, that this must be a cost. They feel that in some way he is being exploited because he gets no monetary return for his work. They fail to recognize that he is paid in nonmonetary satisfaction. If he demanded money in addition to his present returns, he could not compete and could not remain inde-

pendent. The incentives of ownership and self-employment cause people to work longer hours and for less pay from themselves than they would for others. The small builder pays for the privilege of ownership and self-employment, just as the owners of the small corner grocery, the little hardware shop, the variety store, and many other independent purveyors of goods and services pay for the privilege of independent operation. The returns to management may actually be negative.

The remaining items of overhead—depreciation, selling costs, and fees for outside clerical help—are also minor factors for the small builder. Depreciation is low. Excluding the owner's personal auto, it is probable that the total cost of equipment charged per house is less than $100. The small builder is usually a contractor and therefore has few if any selling costs. When he does build for his own account, he is as likely as not to sell the house himself without payment of fees. He uses little or no other outside help. All these overhead items together average about 2.5 per cent of selling price. When overhead is added to profits, it appears that the small builder's total margin between price and direct costs, even in the very prosperous postwar period, is slightly more than 8 per cent. This covers all charges for supervision, profit, depreciation, rent, and other overhead (Appendix E).

How can this 8 per cent figure be reconciled with the 15 per cent frequently quoted as a fair or proper charge for these items? The housebuilding industry is simply too competitive in the lower levels for any such return to exist. Among small firms, increased demand and boom conditions have been reflected primarily in a decrease in the number taking losses and an increase in the number making moderate profits. Only a few firms have made percentage profits even approaching what many consider necessary.

A somewhat different picture of overhead costs and profits exists in those small firms in which the owner has become a full-time executive. As volume increases, overhead structure also develops. In the 10–24 completion group nearly a third of the owners operate as working foremen; somewhat more act as job superintendents and full-time executives, no longer using tools but neither employing additional aid; and fewer than a third of them not only spend full time on executive duties but also hire an assistant. In these firms, if the owner performs direct construction supervision, assistants usually

help in estimating or expediting; if the owner specializes in the nontechnical aspects of the job, the assistant may be the primary site supervisor (table 20 and Appendix D).

As size increases, legal structures change also. Only 38 per cent of these 10–24 unit firms are still sole proprietorships; one-fourth are partnerships; and nearly one-eighth are corporations. The incidence of affiliated firms is also greater, nearly one-fourth being related to some other type of business. The firms in the 10–24 group build, on the average, $200,000 worth of units per year. The total return to the proprietor has averaged $18,400. Because he no longer works as a carpenter, this is all charged to overhead. After again subtracting the $5,000 assumed necessary to cover his actual wages as a supervisor, his net profit is at the rate of 6.7 per cent per sales dollar (tables 27, 33–35).

Other overhead expenses are again insignificant. Depreciation on equipment averages about 0.5 per cent per sales dollar. The firms in this group are still most likely to have their headquarters in the owner's home and to use only part-time clerical help. The owner himself probably does a good deal of selling. Assuming that $4,000 will cover all of these incidental expenses, and adding this to the $18,400, it appears that total overhead and profit in these firms have risen to about 11 per cent per sales dollar.

All these facts indicate that small housebuilders have brought overhead charges and profits close to a minimum. Difficulties still exist. Adequate management and supervisory skills are a luxury that small firms cannot purchase with the small sums available—a fact that becomes apparent in a discussion of their records and controls.

Financing

For an industry in which the average firm is commonly supposed to live a hand-to-mouth existence, builders' total assets are surprisingly high. This is indicated in the first column of figure 2—the balance sheet of an average small builder. The balance sheet is composed of the median holdings for each type of asset or liability found in an examination of builders' financial reports.[3]

The median small builder (1–9 units completed) had total assets of $36,500. A frequency distribution of this item in all firms bears out the fact that in the postwar period builders have been relatively

[3] See Appendix E, and tables 28–35.

affluent. Only 5 per cent of the small firms had less than $10,000 in total assets, whereas more than 17 per cent had more than $100,000 in assets.

These figures are influenced by the fact that small firms are predominantly unincorporated proprietorships rather than corporations, and therefore their balance sheets contain both business and personal

FIGURE 2

Financial Balance Sheet for a Typical Householder of Each Size

Item	Median holding of builders in size class			
	1–9	10–24	25–99	100 and over
	in dollars			
Current assets	15,200	42,700	160,000	562,000
Tools and equipment	2,700	4,000	8,500	17,500
Real estate and buildings	16,200	27,600	30,500	310,000
Miscellaneous assets	2,400	13,700	58,000	190,500
Total	36,500	88,000	257,000	1,080,000
Liabilities	6,300	36,200	145,000	661,000
Net worth	30,200	51,800	112,000	419,000
Total liabilities and proprietorship or capital	36,500	88,000	257,000	1,080,000

Source: Tables 28–32.

assets. No simple method exists of separating in financial statements builders' personal property, which includes such assets as their homesteads and savings, from those used in their business. For many purposes, of course, no real division is desired. Personal property is not available for use in construction, but it does serve as additional security against which working capital can be borrowed. In addition, since these enterprises are unincorporated when the builder enters into any venture, all his assets, no matter of what type, are at stake.

It is noteworthy that builders own most assets outright. The ratio of their net worth to total assets is high. The median small builder borrows only between $6,000 and $7,000 compared with an average net worth of more than $30,000. For an industry in which credit supposedly plays such an important role, this is a small amount. The

distribution of net worth among small firms follows the same relative characteristics as that of assets. Virtually no firm is worth less than \$5,000; somewhat more than one-third have holdings between \$5,000 and \$20,000; nearly 40 per cent have a net worth between \$20,000 and \$50,000; and more than a quarter of even these small firms are worth more than \$50,000 (table 30 and fig. 2).

Net worth is important, but it is not the prime factor that determines the amount of work the builder can perform. Because much of his net worth is frozen, it is his working capital—mainly cash—which is of primary importance in determining his financial ability to handle work.

At any given time, the small builder's working capital is likely to include about \$5,000 in cash plus another \$1,000 or \$2,000 in war bonds or similar assets. In addition, he is owed an equivalent amount for work in process. His current assets, representing both cash and the work for which he has not yet been paid, are slightly more than \$15,000. Because of the mixture of personal and business assets, his percentage of total assets currently available is somewhat less than for other categories of building. A builder's current and working assets pass through a continuous cycle. In the process of building, cash is drawn and becomes work in process. Then when payment is received for work completed, the amount of work in progress is decreased and the cash item again increases.

Because of the relatively low percentage of his total current assets, the small builder (completing 1–9 units) has a low turnover of his capital, his sales-equity ratio being approximately two and a half to one, compared with a median ratio of five times per year for the large firms. This slow turnover, plus a relatively small profit on sales, results in the low return on net worth made by the small firm (tables 31, 34).

The second item in the builder's balance sheet consists of tools and equipment. This item averages \$2,700 and emphasizes the low level of mechanization existing in the industry. Even so, the average small firm has an amount of equipment nearly five to ten times as high per completion as do the larger firms in the industry, a discrepancy which reflects the lumpiness of equipment expenditures. The small builder's high equipment ratio compared to the large builders' is not caused by the magnitude of his own holdings but simply by the extremely low level of theirs. The small builder's equipment usually includes a

pickup truck, a car, a power saw, and hand tools. These are almost the minimum necessary to operate. As size increases, additional equipment is added but at a very slow rate. Since even for the small builder equipment costs are slight (depreciation averages only $100 per house) any spreading of this overhead item is comparatively unimportant (table 32 and fig. 2).

In addition to current assets and tools and equipment, the average small builder owns about $16,000 in real estate and buildings and $2,400 in miscellaneous assets. The real estate is usually his own home, though occasionally he holds a few building lots for speculation. Miscellaneous assets include minor investments in other ventures.

Although the builder's net worth is larger than might have been expected, it still does not suffice to cover his financing needs. The average house contract is large and takes a long period to complete. Therefore, a procedure is necessary whereby builders can collect on work in progress and replenish their cash; otherwise practically none could accept jobs as large as a house.

The problems of the small contractor in construction financing are discussed at this point, and in the next chapter the construction financing of operative builders is discussed. On contracts, final financing is the responsibility of the owners, who, in most cases, use either a conventional loan or have sufficient funds to pay for the entire cost of the house themselves. Since it is a luxury market, owners who contract for houses are likely to have adequate financial means.

By exercising diligence and assuring himself that he is dealing with a responsible party, the contractor can be certain that adequate funds for final payment on the contract are available before he starts. He need not concern himself with the problems of the buyer's financing. All he has to do is provide sufficient capital to meet his own current bills between receipt of payments against the contract. The amount of capital he requires will depend upon the rate at which he expends funds for a house, and the rate at which he receives payment for it from the owner, plus some additional amount to meet unknown contingencies such as an increase in costs above his original estimate.

To keep the amount of capital invested in any job as low as possible, the contractor wants to be paid for each item as soon as it is placed in the house. In this, his interests are opposite to those of the owner, who is interested in security. The contractor wants the least possible

investment in any single building so that he can handle the maximum number of jobs with his limited capital. The owner wants to be sure that the contractor has sufficient funds to finish the job. He worries lest he finds himself with a partly finished job, no contractor, and no funds. Such a situation may arise if he pays the contractor for all or more than the work put in place, or if the contractor estimated incorrectly.

A compromise between these divergent interests is found in the normal system of "draws," or partial payments against the agreed upon contract price. Under this system, the owner deposits with a bank or other escrow agent sufficient funds to cover the contract. Where a loan is involved, a bank usually performs this function. At the start of construction, the bank holds the owner's equity and, in addition, his signed note to cover a loan to pay for the remainder of the contract. As the house is constructed, the bank lends against the work actually completed. The contract agreement specifies the rate at which payment for the work will be made. Many possible payment methods exist: for example, the monthly percentage of completion achieved may be estimated and an equivalent percentage of the contract paid out; payments may be based on bills paid by the builder; or agreed-upon payments may be made each time a particular stage of the house is reached. The last method is most common in this area. Agreements normally state that the bank will pay to the contractor 20 per cent of the contract price at each of five stages of construction. Normally the completion of a stage is certified by the architect or the owner. The stages used in this area are usually: (1) upon completion of foundation and rough flooring, (2) at completion of roofing, (3) at completion of plastering, (4) at completion and acceptance of job, and (5) after the lien period, which in this case is thirty-five days after completion of the job.

The decision as to whether or not the contractor has sufficient working capital to undertake a job is made by the owner or bank after a credit investigation. Infrequently a performance bond is required. These apparently have not been used in the average case in the postwar period on the assumption that contractors who could obtain a bond usually would not need it, and that the system of partial payments adequately protects the owner.

The use of the five-payment system means that a contractor may have a personal investment up to 20 per cent of the value of a contract

in each job at any time. When his investment has reached that amount, he should have reached the next stage and should be able to draw against the contract. Since this is true, his total contracts under construction at a given time should be limited to five times his working capital. Otherwise there are likely to be periods when he cannot meet his bills because his investments in work in progress exceed his available capital. He may be solvent but illiquid. Also, of course, some additional capital should be available if unforeseen adverse happenings develop, and he actually loses money on a contract. If this occurs, both his solvency and liquidity may be in danger.

Actually, the required amount of working capital may be somewhat less than 20 per cent of each contract. There may be a lag between installation of work in a house and his payment of bills. Thus at a certain stage, he may be paid for materials installed and subcontracts for which he still owes the trade contractor or material dealer. At any time, he is the beneficiary of an average of two to three weeks' credit from his workers, trade contractors, and materials dealers, which, in effect, increases his working capital. By adjusting his work properly and using this additional credit, he may be able to handle contracts equal to ten times his working capital instead of the five considered normal.

Such an expansion would be, of course, dangerous for the owner even if favorable to the contractor. The owner may find he has paid for a house which, because of mechanics' liens, he only partly owns. If the owner has paid the contractor upon completion of a certain stage, but the trade contractors and material supply houses have bills outstanding, the owner may find that he buys his house twice, through having to pay the bills of these firms in addition to what he has paid to the builder. For this reason, in certain instances payments to cover materials and trade contract bills are not made directly to the contractor, but instead a system is set up whereby he submits these bills to the escrow agents and they send the checks directly to the subcontractor or dealer. Such systems are not common in the Bay area. The average contractor, even if short of working capital, usually has other securities adequate to insure proper completion. In fact, in many cases banks will lend contractors working capital on personal notes with this other security in mind. Other loans may be secured by chattel mortgages against tools and equipment.

Contractors on the whole have had adequate capital for their operations. If, however, they attempt to become operative builders or to expand operations, the problem of capital, and especially that of construction financing, becomes critical. The average builder finds that his capital is not sufficient, and he cannot borrow enough additional to handle the jobs he might obtain. The firm would like to expand but is not able to because it has no method of raising additional capital.

The Market

The problems of marketing, land, and product development are completely interrelated for small builders. Firms must decide upon the type of building they wish to perform and also upon the market for which they aim.[4] If a firm decides to become an operative builder it must obtain land and plan its houses. If it does not wish to perform these merchant-building functions it can enter the contract field and concern itself with the problems of bidding.

As with most functions of small firms, these problems are handled in a rather elementary fashion. The decision as to the type of building is far more likely to be based upon the firm's past history than upon any economic considerations or ideas of what might be most profitable. However, depending upon whether its decision favors contracting or merchant building, the firm's course of action will be markedly different.

Firms that undertake operative building are hampered in all their decisions by a lack of market knowledge. Little basis exists upon which to choose designs, and builders have difficulty deciding whether or not to adopt innovations in style or material. Key factors shaping decisions are the availability of land, the selling history of the selected location, and the current selling rate for new houses in the area.

The first of these factors—land—is most important. The small builder in the Bay area searches constantly for advantageously priced lots in new expanding areas or in old familiar ones. If he can afford to, he will attempt to maintain a small inventory of lots. He buys those that look promising and that can be had at a reasonable price. The location and price will have an important influence on the units he builds.

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[4] This section and the remainder of this chapter are based on the survey described in Appendix D.

Given available lots, the builder will determine the style and price class of his units in accordance with his and others' past experience. The price range will be established by the general rule of thumb which relates proper land costs to selling price and acts as a guard against over- or underdevelopment of a particular lot. Percentage rules attempt to insure a proper blending of the house into the neighborhood. If necessary the arbitrary ratios will be relaxed to insure such conformity.

If a builder uses a design which has sold easily in the past, risk of serious error is reduced. In addition, the technical building process will be somewhat simplified because the design will be familiar to both his crew and himself. If, however, a new design or style has become popular in the area (frequently as a result of changes introduced by architects and owners working through contractors), or if a particular new feature strikes his eye, he may adopt it. Stock plans are adjusted to introduce these new ideas and to conform to particular sites. The builder roughs out his ideas and turns them over to a draftsman for incorporation into final plans. He may continue to adjust the plan during the process of building. Decisions about materials innovations follow the same path as design; they will be introduced if they seem to be economical and have gained popular acceptance.

As a result of this type of analysis, houses similar in style and price will be built until a few remain unsold on the market for above-normal periods. When houses back up in this manner, the builders will attempt to find a new style or a price range that does sell. Changes or innovations are likely only when the market situation shifts and the builder must find a new solution to the altered conditions or fail.

When a house is completed, the operative builder still faces the problem of sales. The small firm has the choice of attempting to sell the house itself or of paying a real estate broker for this service. Half the builders use one method and half the other. A builder puts out a "For Sale" sign when he starts to build. If no sale takes place before the house approaches completion, he may advertise. The period in which he will attempt a sale without brokerage depends on his estimate of the market, time, and his cash needs. If the last prove pressing, he may hand the sale over to a real estate broker on a brokerage basis. In the remaining cases, the house is put in the hands of a real estate broker at the outset. Frequently this is on a *quid pro quo* basis.

The agent is given the listing in return for service he has performed in finding suitable lots, assisting with financing, or furnishing usable market information. As firms expand and tend toward the upper limit among small builders, the payment of a regular broker's fee becomes less frequent. In the group from 10 to 24 completions per year, the builder is likely to sell the units himself, hire a salesman, or enter into an agreement with a broker to handle them on special terms. In each method, the cost of selling will be somewhat less than normal brokerage fees.

The problem of the contract builder is obviously different. He is not concerned with market analysis but with successful bidding. The opportunity to bid usually comes through informal channels. Invitations to bid come from architects with whom the builder has previously worked or from prospective owners referred by friends or attracted by the contractor's sign on houses he is building.

In these instances, the design and approximate cost will have been decided before the builder enters the picture. He may, however, be asked for suggestions or, if the cost of the initial design is too high, as has been frequent in the postwar period, he may suggest possible alternatives.

The time and effort spent on a bid will vary depending on the complexity of the design and the number of new and unfamiliar materials proposed. The estimate forms and methods used by contractors are discussed in a following section.

Preparation of a bid for an average house takes from two to three days. The time required for small commercial buildings may be double this. Half the time is spent on the take-offs and estimates of direct costs; the other half in dealing with the subcontractors and materials suppliers. This two-to-three-day period includes only the builder's effort and not the work of these other groups.

Total bidding time depends on how long it takes to prepare a single bid and on the ratio of successful to unsuccessful bids. For contractors as a group this derives directly from the number bidding on a particular job as well as on the number of jobs on which bids have been taken but which never reach the construction stage. The individual builder considers his chances on any bid as average and therefore believes his ratio of successful to unsuccessful bids will be approximately the same

as the number bidding. If there is an average of three bidders per job, he will expect to be successful in one out of three bids; if five bidders, one out of five, and so on.

This provides a basis for estimating bidding costs. The interest in this problem is so great that it is worth while to digress somewhat to obtain such an estimate. For example, the small contractor who is a working foreman, will start about four houses per year. If, on the average, he is one of three competitors for each job, his total time spent in estimating will be 4 times 3 (the number of jobs he has to bid on to gain a single success) times two and one-half days (the average amount of time he spends on each bid). He therefore spends about thirty days a year on bidding. Very little of this effort will appear as overhead, since most of the work will be done at night or week ends. If the number bidding on each job is six, the amount of time spent on bidding to obtain the same jobs would double. If the bidder has to spend sixty days per year in bidding, not all of it could be accomplished in spare time and part would be charged against construction.

This analysis applies also to the small contractor who spends his full time as a supervisor rather than working foreman. Assume that he starts 10 houses per year, is one of five bidders each time, and spends two and one-half days per bid. His total bidding time is then one-hundred and twenty-five days. Slightly more than one-third of his effort goes into bidding. To estimate the cost of the contractor's bids per house, assume he charges $5,000 per year in wages. Then one-third of this, or $1,700, must be spread over his ten successful bids. This amounts to $170 per house to cover his bidding labor. If this time were not spent in bidding, he could work on more houses, and the overhead charge against each would be reduced.

To arrive at the total economic cost of bidding, the bidding costs of subcontractors and materials dealers must be added to the builder's direct costs. Their charges are slight since, especially in stable periods and on fairly routine houses, only a few formal estimates will be required. The costs which the subcontractors and dealers must cover will run from $50 to $100. Adding these to the contractor's direct costs, we find that the total bidding cost per house will be from $220 to $270. This, applied to the median-priced contractor house, means that 2 per cent of the price of this type of house goes to defray the costs of the

bidding system. Actually, this overestimates the true costs, because the first group of contractors does not charge for its time and others reduce their charges below this percentage through the following procedures.

Contractors recognize that the cost of bidding is a function of their successful bid ratios. Three methods are commonly used in an attempt to keep this ratio high and the bidding cost low. (1) The contractor will refuse to bid for an owner or architect who, he believes, has requested too many bids. Thus if most jobs have only three or four bidders, he will be loath to compete with more than six and will do so only if forced by unusual circumstances. (2) Many contractors have tie-ins with real estate brokers for what is called a "package deal." The owner approaches the broker, who shows him various lots and stock plans. Eventually they arrive at an approximate over-all price for a particular type house. The builder is then called in and stock plans are adjusted to meet the purchaser's desires and price limit. If the price is satisfactory, the owner makes the purchase from the broker, who arranges financing, and the contract is awarded to the builder directly without consideration of other bids. (3) In the final method, the owner approaches the builder directly with some idea as to the type and price of house he wants. Either the owner or the builder furnishes the lot. The house is then designed by the owner and builder together, usually from stock plans or from magazine clippings and ideas brought by the owner. Occasionally, an architect is called in. If an agreement is reached, a contract is awarded directly without any call for bids.

An important difference should be noticed between contractors working on bids and those working on deals of the type discussed above. Custom houses cost more, not primarily because of the bidding effort expended on them but because additional risks, delays, and training required in their construction affect both the bids and actual work. When builders have to perform different or unknown functions, they are on slippery ground. They lack knowledge, and as a result, unfamiliar work such as is found in many custom jobs is likely to cost more.

The unexpectedly high costs of what appear to be simple jobs and the very great variety in bids from supposedly competent contractors have frequently been commented upon. These are basically due to two factors. (1) Contractors may differ in their estimates of the cost of

unknown contingencies, depending partly upon their own particular needs and desires for new work. (2) The cost of work on contracts of a design new to a particular builder varies. The builder must spend more time on planning, supervision, and actual experimentation on the site when he undertakes types of jobs new to him.

Even if the profit level is the same on work performed on bids as on work done operatively, the former is likely to cost more. Innovations and specification of custom details not familiar to the builder raise his costs, and these must be paid for. As a result, contract work is primarily limited to the high-priced market which is willing and can afford to pay for extra details.

Production

Observers watching an average small builder during the construction process are struck by how traditional and familiar his production techniques appear to be. The assertion is frequently made that only a few changes in methods have occurred since Egyptian days. Building is performed by about the same number of men, each going his own way. There are few obvious changes in the tools used or in the types of materials employed. The number of subcontractors arriving and leaving at various times has increased, not diminished.

Such observations, however, do not penetrate below the surface. Important changes have taken place in the housebuilding process, even among smaller firms. The organization of the production process has improved. Preplanning, in use of both manpower and materials, is commonplace. There is a decided increase in mechanization. Perhaps more important, far more of the total house is purchased in fabricated form.[5]

[5] It should be noticed that this book deals only with the problems of housebuilders who construct and assemble houses at the site in the conventional manner. Conventional—so-called on-site—builders should be differentiated from prefabricators. In this book, following the custom in the Bay area, precutting is considered a basic conventional method, as is the purchase of fabricated subunits such as windows and cabinets, or the preassembly of major sections at or near the site. Prefabrication is used to refer to the construction of most or all of the major assemblies, such as walls, in a factory or some other location away from the house site. The number of houses built by any type of prefabrication in the Bay area was extremely small, and the number which were factory fabricated was virtually nil. Obviously the methods and problems of builders as discussed in this book will not apply completely to the prefabrication industry. A comparison with that industry shows many similarities but some important differences. Cf. Burnham Kelly, *The Prefabrication of Houses* (New York: John Wiley and Sons, 1951).

With today's techniques, the small builder is primarily an assembler of wood products and a coördinator for the installation of other parts of the house, particularly equipment and finishes. The amount of actual fabricating he does has steadily decreased. Building consists of purchasing finished or semifinished products, performing some cutting, a minimum of planing, and a great deal of nailing to arrive at the completed house.

This change is most obvious in the case of lumber. At one time, not so long ago, the builder would have bought logs and finished them himself. Somewhat later he still would have made his own doors and windows and cabinets. Now, however, he purchases his lumber finished and frequently already cut to the required sizes. Wallboard comes in long sheets, a fair percentage of which requires no cutting. Windows, doors, cabinets, and trims are purchased ready for installation.

As a result of this trend, the builder's on-site costs are decreasing. Only 24 per cent of the cost of a typical Bay area house is value added by the small builder himself. Another 24 per cent covers his purchases of materials, and 35 per cent, or the largest sum of all, goes to subcontracts. Finally, 13 per cent is required for the land and 4 per cent for incidentals (table 49).

This breakdown somewhat underestimates the importance of site work because, in addition to that of the builder, a major part of the work of the subcontractors also takes place there. Together they produce 43 per cent of the final value, with 28 per cent covering their joint site labor, and 15 per cent their profits and overhead. The remaining 57 per cent pays for purchases of materials, land, and other services (tables 46, 50, 51, and 52).

Fewer changes have occurred in the actual organization of the production process than in the types of materials purchased. Figure 3 shows the thirty principal operations typically performed on houses built by small builders in the Bay area. The small builder performs sixteen with his own crew and subcontracts the rest. For planning and organizational purposes, these operations are divided into four main categories.

The first group includes the preparation of the site and the construction of the foundation. After the site is laid out, grading is done, usually by a subcontractor. Thereupon, the builder starts the actual foundation process. The trenches for footings and foundations are

FIGURE 3

OPERATIONS IN THE CONSTRUCTION OF A TYPICAL BAY AREA HOUSE

Direct labor	Subcontracted
Site preparation and foundation	
Building layout Foundation excavation Form work Placing mudsills	Grading Concrete and cement finishing
Framing	
Placing joists Subfloor Framing Roof framing Roof sheathing	Plumbing Electrical Sheet metal and heating
Walls and roof	
Placing building paper Siding Installing windows and doors Dry wall installation Exterior trim	Roofing Drywall taping Masonry
Finish	
Interior trim Cleanup	Plastering Painting Hardwood flooring Linoleum and asphalt tile Ceramic tile Shades and blinds

SOURCE: Appendix D.

marked out and dug, usually by hand, following which the builder and one or two carpenters make the forms for concrete and tie in the necessary steel reinforcing rods. This is rough carpentry, quickly and traditionally done, with few if any innovations in the process. Boards are cut to size by hand, and the necessary supports are driven with sledges.

When the foundation forms have been prepared, the concrete is poured. Depending on how busy he is, the builder may perform this

job with his own crew or may sub it out. The task is relatively simple and no longer involves mixing the concrete on the site, as was common before the war. In most cases the concrete is purchased already prepared and delivered in a transit-mix truck. The builder needs only to be certain that the trucks can get onto the site and that necessary troughs are available to take the concrete to each of the forms. If this is impossible, the concrete is distributed by wheelbarrows. The concrete is pushed through the troughs and tamped by hand. Before it hardens, the wood mudsills are placed in it.

Mudsills have to be anchored in by bolt. Frequently, the holes for the bolts are drilled electrically, though in the majority of cases the old-fashioned bit and auger are still used. In either method, the small builders make certain that by this time there is electricity at the site. The electric wires entering the job mark a step forward in mechanization and reflect the increased importance of power tools on even the smallest job.

The second group of jobs in house construction centers around erecting its frame. This involves putting in the joists and subfloor, placing studs which have to be braced and have firestops installed, and finally erecting the roof rafters and roof boards. These processes have been improved through important changes in construction technique.

Since each house built by a small builder differs from all others, he and his carpenters have to refer constantly to the blueprints and have to do a large amount of hand measuring and cutting. This hand work, however, is decreased whenever possible by preplanning. Joists are used as they come from the lumber yards. The subfloor is nailed on with boards of odd lengths and then all projecting ends are cut off at one time with a power hand saw. The same method is used for the roof boards. Studs are ordered either precut from the lumber yard or they, plus most of the fire-blocking, are cut by power at the site.

Wall frames are assembled in horizontal positions on the subfloor, where studs are nailed to the bottom and top plates. Necessary headers, cripples, sway bracing, and other parts of the frame are installed. When one wall of the frame has been completely nailed together, it is lifted into place. The other exterior and interior walls are similarly nailed, raised, and joined together. During the framing, as well as in construction of the roof, hand and power sawing are intermingled.

The amount of power used will depend upon the efficiency of the individual builder as well as on his and his crew's familiarity with the job in hand.

While the builder is framing the building, trade contractors, particularly plumbers, electricians, sheet metal and heating men, are also at work. They, too, mix old-fashioned and modern techniques. Electric drills and electric handsaws are used side by side with hand tools. Since each house differs so much in design, these trade contractors cut and fit all their pipes, wires, conduits, and the like on a completely individual basis.

In the third part of the production process, the house is actually enclosed. In this group of jobs, the division of work between builders and trade contractors depends upon the particular materials used. Some parts are almost always subcontracted, as for example, roofing, plastering, and stuccoing. However, if, as is common in this area, siding and wallboard are used in place of plaster and stucco, the builder will normally perform these functions with his own crew, and there will be fewer subcontractors at work on the house.

In enclosing the house, except in expensive units or in certain areas where codes require it, sheathing is not used. Wood siding is usually installed directly over building paper, and stucco is installed over linewire and building paper.

The builder's decision as to whether to use his own men to install wallboard is difficult. His own carpenters can do the job adequately. However, carpenters specializing in wallboard have become so expert that their wages plus the trade contractor's overhead and profit still average less than the builder has to pay his own men. His decision may hinge on his time schedule. If he is running out of work, he will perform this function with his own crew in order to keep them steadily employed and together. Alternatives such as this are important in adding flexibility to the builder's work schedules.

Included in the enclosing process are the installation of window frames, windows, door jambs, and outside doors. In small firms, these jobs are almost always done by the builder's own men. For the majority of houses the windows arrive with the prime coat of paint already on and frequently are preglazed, thus eliminating another subcontract.

The final phase of the house is the finishing and installation of equipment. Except the finish carpentry work, which includes hanging

doors, installing cabinets, trim, bookcases, and hardware, this phase is almost entirely subcontracted. Whether performed by the builder's or trade contractor's labor, finish work is mainly a hand process, partly because of a belief that handwork is quality work and machine work is not, but also because for many purposes the use of a complicated tool in houses built individually on scattered lots is not economically sound. In certain instances, it may reflect restrictions of unions against machine work.

Establishing the production process is primarily a problem of the builder's use of labor, and here the greatest organizational differences occur between the small and large builders. The average small builder in the Bay area employs only a small, unspecialized crew of two carpenters, one laborer, and the owner himself as foreman-carpenter, whereas the larger builders use a far more complicated system.

The average level of skill on small jobs is high. Carpenters on custom jobs have to be able to work on their own without making errors. These houses are individually designed and must be erected from blueprints. Since plans are really shorthand notes rather than spelled-out instructions, the carpenters have to be able to understand what is desired and use their heads as well as their hands. In addition, the level of quality has to be high. Finally, since there are no efficiency standards to measure the amount of work to be accomplished, each worker must be willing to apply himself to the job in hand.

Finding and holding skilled men is one of the major problems of the small builder. It is accomplished primarily on a personal basis. The builder has usually been a carpenter and knows others. He asks among his friends and urges them to let him know if they or other good men are available. Frequently several carpenters working on a house may actually be licensed builders, who periodically take work for their own account.

The similar background of the owner and his men results in a rather informal relationship. The builder has been an employee. He works side by side with his men and frequently does more work than any of the others. As a result, personal loyalties develop, and the carpenters tend to identify themselves with the firm and with the task in hand.

A builder who has found skilled, efficient, and reliable men will go to great lengths in his attempts to keep them employed. This usually

means arranging schedules so as to give continuous employment. Since changing men costs money and lowers efficiency, it may be worthwhile to take certain jobs at a slight loss. Men get used to working with each other and in addition become familiar with the firm's methods. A change of crew is expensive not only because of the time and effort required to break new men into one's way of doing things, but also because a long search may be necessary to find equally skilled and efficient men. In addition to steady employment, small builders frequently hold their men by paying bonuses above scale so that wages will equal efficiency. On the job themselves, they are able to recognize the value of the individual to the firm and pay accordingly.

The informal relations and identification of the individual employee with the firm lead in general to a minimum concern with union rules and regulations. Frequently, for example, the carpenters will perform odd jobs technically falling under other jurisdictions. Cutting corners in this manner saves the firm the extra trouble and expense of hiring special mechanics for small tasks and generally expedites the entire process. Small firms are so spread out and their relationships with their own employees are of such a close nature that problems with the union are rare. Most unions fail to check work at scattered sites. Difficulties arise only if a dissatisfied employee complains. These firms pay union rates. Their employees are all union members, and they maintain union conditions, but this is the extent of their labor relationships with outside organizations.

The less strict adherence to union regulations and the greater individual efficiency of the small firm's carpenters all aid in keeping labor costs down. Even so, because they cannot take advantage of the efficiency resulting from division of labor, the average small firm's costs are higher than are those in the larger categories. The greater skill of the average small firm's employees is a necessary condition to its continued survival. It does not succeed in giving them as low unit labor costs as can be achieved with specialization.

The problem of making available to these scattered sites the greater mechanization and specialization now being employed in large tracts is the main one facing the small firm. Unless his production improves, the small builder can never compete in efficiency, and he must reconcile himself to that small market which is willing to pay a premium price for custom work. Experience in other fields has shown that this

custom market is extremely vulnerable, especially in periods of economic fluctuations, and for this reason the small builder is in a dangerously exposed position.

Purchasing

In purchasing both materials and subcontracts, the small builder again finds himself limited by size. He has no choice but to continue to buy in the traditional manner from the wholesale-retail lumber yard. When a builder buys from a retailer, however, he does not—as has so often been alleged—pay the retail or over-the-counter price. Instead, he gets a builder's discount, varying from 5 to 20 per cent, depending on the particular item. Eighty per cent of small firms purchase through the retail channel. Only as firms approach the top of this size class are certain items—particularly lumber—purchased at wholesale. One-third of the builders in the 10-to-24-per-year class do buy lumber at wholesale, and about 5 per cent buy hardware directly from a wholesaler or broker (table 23).

Four basic materials—lumber, hardware, millwork, and wallboard—are purchased directly by the small builder. All are normally carried by and bought from a lumber yard, though sometimes millwork or cabinets are ordered directly from specialty shops. About half of the small firms trade regularly with a single building-materials dealer. The builder takes his material lists to the dealer, asks him to figure the price, and then arranges for delivery to the site. Delivery is usually made in two or three loads, planned to arrive at the site as required.

The other half of the small builders tend to shop around, to compare price quotations, and to ask for competitive bids on their materials list from two or three dealers. This is a particularly prevalent practice among contractors who are themselves bidding on jobs, and who find that small variations in materials cost may suffice to win or lose a bid. In addition, since the builder agrees to a definite price for his work, he wants to cover himself by having a definite materials price quotation in hand. A definite price is not as important to the operative builder, who may be able to pass on in his sales price any cost increases he is forced to incur during construction.

Builders who do not shop around claim that they obtain better quality and service. They have dealt with a particular firm and have

been satisfied. They believe that they are better off paying slightly higher prices, if necessary, to receive assured service and to maintain a source of supply which will be open to them even in periods of shortages. The other half disagree, finding that by demanding bids from several firms, they increase competition and obtain their goods at slightly lower prices. Their payments depend upon the market and the need of several dealers for business rather than upon one lumber yard's estimate of the current situation.

Why does the small builder buy materials from retail dealers and not directly from the mill? The reasons are primarily convenience, required quantities, perhaps credit, and quality. The small builder purchases materials only about once a month. He needs many different types. It is convenient for him to make all his purchases in one spot at one time without wasting hours shopping. He succeeds in doing this by taking his materials list to his habitual supplier or suppliers. By using a dealer he eliminates the necessity of maintaining inventories. He does not have to be concerned with coördinating shipments from distant sources. The problems of unloading, handling, and delivery are arranged for at one time. The material dealer's crews specialize in this work and can do it for less than the builder would have to pay if he set up a special handling crew each time.

Even more basic than convenience is the problem of quantities. Most manufacturers deal in carload lots, the minimum amount usually purchased by a dealer. This allows savings in freight, in handling, and in selling costs compared with smaller units. Small builders cannot use full carloads of most items, and manufacturers are not interested in selling smaller quantities.

The importance of the credit furnished by the materials dealer has perhaps been overemphasized. Although the contractor does not have sufficient working capital to tie up large sums for long periods in inventories, as would be necessary if he bought in large quantities direct from manufacturers, he still is currently as well off as purchasers in other fields and can meet his bills promptly. The dealer furnishes the capital while goods are in transit and storage and for an additional two to three weeks after the material has been delivered to the builder's site.

The problem of quality is mainly important in lumber, the largest item purchased. Since it is available in single truckloads from brokers

or truckers, lumber could be bought wholesale by even the smallest of Bay area builders. In using a wholesale channel, however, the builder finds that he cannot complain about deliveries of poor quality, which are not infrequent. The problem is serious to a small builder because his purchases are small and take place only at intervals of one or two months. Any losses on individual loads cannot be made up in the course of the year. Big builders, on the other hand, can demand better quality because a large number of deliveries are made under a single agreement. Furthermore, even if they do receive a poor load, it is not wasted because they can use it on jobs which do not require high grade lumber.

The small builder recognizes that he is paying for special services; and since the cost of these services, plus the dealer's profits, is reflected in the price, he wishes that they were not necessary to him. On the other hand, he realizes that with another type of distribution he might be neglected in favor of the larger builders. If he were unable to get these services when he needs them, his costs would be higher.

The problem of small size also affects the builder's relations with his trade contractors. His difficulties do not arise, as many have believed, because he is forced into a poor bargain by larger and stronger trade contractors; even small builders are as large as the average trade contractor. He is handicapped because he cannot spend enough time in coördination and in making certain that his trade contracts are carried out in the most efficient manner.

Subcontracting is prevalent even in the largest industries. The main reason that so much more attention has been called to it in housebuilding would appear to be that it is more apparent when men from many trades and under different managements all work on the same building at one time. This intermingling of different subcontractors is a situation created by site assembly. Otherwise, subcontracting in housebuilding hardly differs from that in the other parts of the economy.

Subcontracting is a necessary step toward efficiency and is not a system imposed on the small builder by outside forces. As long as houses require many different skills in their assembly, a builder is better off using specialists rather than Jacks-of-all-trades. The question is simply whether it is more efficient to hire the specialists himself or to let trade contractors do the jobs.

The average house requires ten to fifteen specialists, some of whom may spend as little as half a day working on the unit. The builder cannot take time and does not have the skill to hire and supervise each of these specialists directly. If he attempts it, he finds himself spending full time in labor negotiations and in finding the necessary men. If he finds the men, he then discovers that the amount of work each has to do in the house does not come out in even units a day. If he hires the men directly, he has to pay for nonproductive time while the worker stands idle waiting for another job, or moves to another site.

By subcontracting, the builder can eliminate these wastes. The trade contractor coördinates all jobs of a particular type. He is able to assure the most skilled workers in the craft steady employment by scheduling them from one builder's job to the next. For this necessary function, the trade contractor charges relatively small sums. Trade contractors, like small builders, tend to be working foremen who perform their overhead functions in their spare time and do not charge very much for their supervisory work.

The problems of the builder's relation with his trade contractors are complex, but they are not as difficult as many have believed and stressed. For example, it has been claimed that the system is inherently expensive because the builder must obtain bids from three or four subs for each of his ten or fifteen subcontracts. Obviously, such a system would be extremely inefficient. Both builder and trade contractor would be spending most of their time in bidding and very little of their time actually on the job, with a consequent loss of time and money that could hardly be estimated.

Actually, this type of problem does not arise. The relationships between the builder and the trade contractors with whom he works are stable. Practically no shifting of trade contractors occurs as the builder moves from one job to the next. He tends to work very closely with a picked group of subs and does not seek independent bids for each job. A change in subcontractors is uncommon. Some firms boast of having operated with the same group for twenty years. Subcontractor prices (in 85 per cent of firms) result from direct negotiation rather than from a formal bid system. During stable periods, the trade contractor will not even be asked to figure jobs beforehand. He will be informed of the location of the job, and it is assumed that previous prices will prevail.

A change in subcontractor is in order if the latter cannot or does not meet existing competition. Especially in a fluctuating market, but occasionally in normal periods as well, a builder may test the market or he may be approached by independent trade contractors offering favorable terms. If his own man cannot stand up to these other offers, a change is made. Dissatisfaction with service, delay, disagreement, or deterioration in quality of work may also prompt a substitution in trade contractor. Such occurrences are infrequent. Small builders average less than one change per house among the 12 trade contractors employed on the average job.

For new work, for unusual work, for work during periods of shifting prices, and for the tasks which vary with the design of the house, especially if these are contract houses, the trade contractor will be asked to quote a price in advance. Formal bids from competing contractors will be used primarily on houses on which the builder himself is bidding. This type of bidding is, of course, far more common on nonresidential work and frequently is required on public works.

Among small builders the coördination and control of subcontracting also constitute a simple process. When a house is begun, the sub is informed of the approximate time his services will be required. He is again alerted a week or so in advance and a day or two before needed. The work schedule is usually sufficiently flexible to permit a delay of two or three days between the time the sub is supposed to appear and actually does. The trade contractor makes an effort to meet any pressing needs promptly. At the same time, builders recognize that certain delays are inevitable and, providing they are not too long and that urgent requests are handled promptly, work does not suffer as a result of this flexibility.

The work of the subcontractor is supervised by the builder in the same informal manner. The small builder is either working on the job near the trade contractor or else he checks sometime during the process or after the job is finished. If he believes it does not meet proper standards, he will hold back payment until the work is corrected or a satisfactory agreement is reached.

This system is not, of course, highly efficient, any more than are the small builders' purchases through a long distribution channel. This inefficiency is not a result of poor management or of external influences forcing the builder to use channels which he does not desire, but

rather, a function of his scale. The small builder solves his particular problems in the only way open to those of his size. As long as he has a function to perform in the housing field, this problem of scale and therefore of relative inefficiency in purchasing will probably persist.

Controls

The problems of estimating, budgeting, and accounting remain difficult for the small builder. Marked improvement is required if his planning, analysis, and financial judgments are to be more effective. The small builder faces the same conflict that confronts small firms in many industries. How much time can he afford for overhead functions? How can the small owner develop the necessary management skills to perform a whole group of ancillary processes required if he is to do his job successfully? In large firms, various people can be hired, each trained to perform a specialized task which the small man must perform himself.

Outside pressures have brought about progress toward improving control functions.[6] Lending institutions have required builders to prepare preliminary cost estimates. The Bureau of Internal Revenue and the State Licensing Authority require that he maintain a record of all costs for tax purposes. To meet these requirements, most builders now prepare detailed estimate sheets for each house, as well as a record of historical costs, through a set of double-entry accounting books with a column or sheet for each house.

The main factors itemized in both sets of controls are shown in the example of a typical estimate sheet (fig. 4). The builder must estimate and account for his direct labor costs, his direct materials costs, his subcontracts, his direct incidental expenses, and his overhead and profit. Each of these items appears on the sheets in some detail. They summarize the builder's labor and materials take-off and the bid prices received for subcontracts and materials. The complexity of the estimate will vary from firm to firm. Many—especially contract builders—use a complete, detailed estimate of the type found in a standard estimating manual such as Walker's.[7] Others—builders who are continuously producing houses of approximately the same type—may simply base their estimates on previous performance.

[6] This section is based on the case studies and survey described in Appendix D.

[7] Frank R. Walker, *The Building Estimator's Reference Book* (Chicago: Frank R. Walker Co., 1948).

FIGURE 4
CONSTRUCTION ESTIMATE

Job Number........................ Owner............................

Location.......................... Date.............................

Item	Quantity	Labor	Material	Total	Actual
Excavating					
Concrete					
Foundation					
Slab					
Flatwork					
Lumber					
Rough					
Finish					
Millwork					
Windows					
Jambs					
Doors					
Garage					
Cabinets					
Hardware					
Nails					
Rough					
Finish					
Gypsum board					
Electrical					
Wiring					
Fixtures					
Fireplace—chimney					
—mantel					
Floors					
Hardwood					
Tile					
Linoleum					
Heating					
Painting					
Plastering					
Plumbing					
Roofing					
Shades and blinds					
Sheet metal					
Wallboard taping					
Miscellaneous					
Permits					
Sewers					
Power and water					
Insurance					
Title fees					
Recording fees					
Interest					
Commitment					
Plans					
Survey					

When money is being advanced by a lending institution, this estimate will be used as a proposed budget. The agency will use it and whatever other work the builder has in prospect in relation to his working capital as the basis for its decision to lend or not.

Accounting records follow the same form as estimates. A column or card is allocated to each item on the estimate sheet. When payments are made for materials and subcontracts, the voucher or check shows the appropriate job against which they are to be charged, and these are carried to the proper card and column. The foreman who keeps the timecards also records the amount of labor time spent on each job. When the payroll is made out, the total payments are subdivided and charged against the proper house. In this way, when a house is finished the builder's accounting records show all direct costs incurred. He can, if he desires, also allocate indirect charges to the house. Total costs are then compared to the original estimate which serves as a check on the causes of variations and as a means of improving future estimates. Virtually no other accounting or production records are maintained.

Although these records constitute improvements over those used by small builders in the past, they are still not sufficiently accurate to answer many of the questions whose answers the builder needs to know if he is to operate efficiently. *Ex post* he can find out where he has made estimating errors, but this may be too late. In addition, these records are not accurate enough to enable him to measure the many variables with which he deals. As a result, his estimates for his next job will have to be approximations with a rather wide possible margin of error.

Although in this area there is great need of and room for progress, a solution is not obvious. Some improvements will take place as the small builder becomes better educated and as new devices for overhead control are developed which will better meet his needs, but the problem is almost certain to continue as long as he remains small in size.

Determination of Size of Firm

A final, interesting question is why these firms, many of which have been very successful, have not expanded more in the recent dynamic period when opportunities were so great. An explanation obviously includes psychological and sociological factors which do not belong in our analysis. Builders of this size frequently state that they limit the amount of work undertaken because of the worries and headaches

which they feel come with larger size. Their present income is sufficient for their needs, and expansion is not worth the effort and strain necessary to achieve it. There are also, however, certain economic factors which play an important and sometimes dominant role in determining whether a firm will expand (table 21).

Of a somewhat mixed nature is the question of the possible supervisory span of existing management. Nearly a third of the small firms report that there is a discontinuity in the supervisory cost curve which, added to the other factors, determines their size. These builders feel that, given their present organization, they have reached their maximum managerial span. If they expanded their firms, a working foreman would have to lay down his tools and become purely an executive, or a present executive would have to add an assistant. The builder may feel that such a change would exceed his capabilities or would present other problems. He also may recognize that such an increase in overhead would not pay off unless his volume nearly doubled, but would only raise the charges of supervision on each job.

At the same time, the expanded overhead would increase risk. Any downward changes in volume with larger fixed charges would rapidly lower his operating profits. Because of personal experience or the experience of friends or fellow-builders in the prewar period, the small contractor is very conscious of risk in any event. His capital is not large and a few errors in calculation, either on contracts or on speculatively built houses, can rapidly push him under. About 20 per cent of the small builders indicate that the additional risk is the dominant factor preventing their expansion. Small builders frequently are pushing against a capital ceiling. Since banks and bonding companies allow a builder to proceed on a house or contract only if they feel he has the necessary capital, their decisions become the determining factor limiting expansion. One-third of the small builders say this lack of credit has forestalled possible expansion.

A final factor is discussed by builders in terms of available skilled mechanics. This item reflects the prevailing shortage of good carpenters in the postwar period. Most small firms compete in the market on the basis of craftsmanship, finish, and efficiency among workmen. A firm achieves a standard of quality by carefully building up its crew of carpenters. If the firm now wishes to expand, it has the problem of recruiting men of similar skills and, once recruited, of guaranteeing

them a stable level of production. Because the level of skill of men recruited on a temporary basis will be too low, the firm cannot attempt to expand by hiring men for an additional job and then letting them go. This ranks among the most important factors currently inhibiting expansion of small firms.

Summary

The small builder, though still important, is playing a diminishing role in housebuilding production. Whereas thirty years ago he was the industry, in 1949 in the Bay area he produced 45 per cent of the units built by firms and in 1950 only about one-third of the total. This tendency toward greater size and concentration exists even among the smaller firms. The 8 per cent of small firms which completed 10 or more houses in the year constructed nearly 40 per cent of the group's total production. In contrast with this diminishing share of the market, more than 93 per cent of all firms were still small.

The small firm has not suffered from inadequate financing. It has the advantage of extremely low overhead costs, much of this work being performed by the unpaid labor of the owner and his wife. It has not fallen far behind in the amount of equipment it uses or in its techniques. Although its owners—primarily craftsmen tied to their jobs—are not innovators, and some lag does occur in their adoption of new techniques, on the whole the use of new materials and machinery has spread at a rapid rate. The average small firm adopts any innovations within its scope within a year or two after they become general among the larger firms.

The small firm's problems stem primarily from the fact that its organization cannot be stretched to make many necessary improvements. Given its maximum size of overhead, labor force, and purchases, the small firm has only a limited number of possible solutions to the problems of organization and methods of production which face it. It cannot specialize its labor to any extent. It cannot obtain quantity discounts on its purchases. It might improve its records somewhat; but without losing its chief advantages as a minimum overhead unit it cannot make them entirely adequate to handle the job it faces.

If it cannot solve its problems within these limits, then the only other way it can improve its position is to alter the functions it performs in the market. Its present specialization in custom work is logi-

cal. In addition, other changes in its province appear probable. These will be discussed more fully in the final chapter dealing with current trends. New functions might include working in a partnership with large firms or changing the type of product and material purchased.

Its situation in the future appears uncertain. The small builder has a function in the industry, but the size of this function is not clear. Recent history has witnessed improvements in his efficiency, but at a slower rate than that of other firms. As a result, he finds that he cannot compete in the large-scale mass market introduced by cheaper financing aids, but is relegated to the custom market or to building on small scattered lots in more densely populated areas. During the postwar period the larger builder was not interested in these special markets, which are most likely to be affected by economic fluctuations and also carry the greatest risks. The small builder has kept the most dangerous market. Even here he is not secure, for if any large builders decide to enter this market their greater efficiency might furnish such competition as to make his position barely tenable.

4

The Medium Firm

A composite picture of the housebuilding industry is reflected in the activities of the medium-sized housebuilding firm. What is happening in the housebuilding industry generally is happening most typically at this level.[1] Like the industry, this group of firms is in a transitional state, on its way from contract building to operative tract building. This group crystallizes the housebuilding pattern because it is the connective link in the evolution of the industry from the small custom contractors who still stand in the public mind as typifying housebuilders—since they did compose the housebuilding industry of the past—to the big-scale, mass-production tract operators who are changing the shape of the housebuilding industry and giving form to the future.

The two extremes, small contract builders and tract operators with mass-production techniques, are represented at each end of the group of medium-sized building firms. What makes this dichotomy significant of the direction being taken by the industry as a whole is the fact that the firms among the medium-sized builders which have remained contractors have reached their terminal size and volume, whereas the firms which have turned to merchant or operative building have increased in size and number and appear to contain the genes of greater dynamic development.

The medium-sized firm has been defined as one building between 25 and 99 houses per year. The production median of this group of firms is the production median of the industry, a fact which underscores the role of this group as dramatizing the trend of housebuilding. The median medium-sized firms produced 40 houses a year; similarly,

[1] See Appendix C, and tables 10, 11, 13–15.

half the houses built in the Bay area in 1949 were produced by firms completing more than 40 units in the year, and half by those producing less.

Using another measure of volume, if the medium-sized firm were classified by the value of the work produced during the year rather than by the number of units, it would be found that the range runs from $250,000 to more than $1,000,000, with the heaviest concentration around the median of $500,000 (table 11).

There were 77 firms in this group in the Bay area in 1949. They produced 3,512 houses or 20 per cent of the total. Most of these firms were operative builders, taking the first steps toward the potential economies of large-scale operation, though often these steps were hesitant and did not go the full distance toward fulfilling the potentials. Some, however, were already well on their way to real mass production (tables 10 and 13).

One of the characteristics of the group, typifying its transitional state, is a lack of innovation in design or technique. The medium-sized operative builder has grown too big for the directly supervised, individual blueprint work of the contractor, with its originality of design; but he is not yet big enough, does not have the necessary staff, nor is he sure enough of himself, to undertake the advanced innovations in mass-production techniques of the large-scale builder on tracts. The medium-sized firms copy in design and technique. They do not often risk originality or experimentation.

Although many of them have begun to work in tracts, this development is not complete. A few build scattered houses on speculation. Medium-sized firms often build in small groups, with other builders. They can utilize odd, favorably priced lots in the neighborhood of other similar work. Some do small scattered groups of units in cities. Others work on single tracts in suburbs. Of the operative builders in this group in the Bay area in 1949, a tenth of the firms did most of their building on separate lots; about a third built primarily in tracts, but also worked on separate lots; the remainder worked only in tracts. About one-quarter of the units completed by medium-sized firms were outside of tracts (tables 10 and 14).

Only 13 out of the group of 77 medium-sized builders built primarily on contract. Because their supervision of individual work could be direct, these contractors retained the tradition of custom building,

concentrating on craftsmanship and quality. Although in comparison with other house contractors they were the largest, their number of completions were at the bottom of the classification of medium-sized firms. Only 16 per cent of the units completed by medium firms were produced on contract. Attempts to expand house contracting further in terms of volume of production run against obstacles rising out of the nature of the operation. These obstacles include such problems as direct supervision of atypical and "different" houses, of building on unusual lots, of maintaining custom-quality tradition, working to individual blueprints, and giving personal attention to owners' wishes in luxury detail. These problems require individual solution and cannot be determined in terms of a volume operation. Contractors, however, could and did increase their total volume by doing other types of building. Since these buildings and their houses had high unit values, these builders are found near the top of the entire group in dollar volume (tables 10, 11, 13, and 15).

The inevitably greater expense involved in building to individual contract is unquestionably an important factor in the trend away from contract building. It is the merchant builder, in the group of medium-sized firms, who can effect certain economies by adopting some—though not all—of the techniques of the mass producers yet retaining some of the advantages of the small producers. Like the small contractor, his overhead remains low. Because of his larger size and merchant operation he can get materials at a lower cost by buying wholesale. He can organize his labor force more efficiently. He can strike better bargains with his subcontractors. His controls and his possibilities for introduction of new patterns in style and method are limited, but he can offer a satisfactory product, at lower cost, to the consumers who feel that they cannot afford the luxury of custom quality. It is this group which produces the most typical houses, and it is this group which, apparently, is a key factor in the market's price determination.

Background and Organization

Who are the owners of the medium firms?

They are usually men about fifty years old. Their past experience in the industry is shorter than that of either the small or the large builder. They have been active in other fields of business, sometimes

as close to building as real estate or building materials, sometimes as remote as dairying or banking. Their experience has been practical and diverse. On the average, they have spent some six years in building before establishing their firms, though more than a quarter of them started their firms without any previous building experience (tables 24–26 and fig. 5).

Many of them look at building as a place for investment, or as a business, rather than as a craft. From previous experience and from

FIGURE 5

AGE, BACKGROUND, AND TYPE OF OWNERSHIP OF BAY AREA HOUSEBUILDERS IN 1949, BY SIZE

Item	Size of builder		
	Small	Medium	Large
Principal's age, average in years	44	50	52
Firm's age, average in years	4	6	15
Principal's previous building experience, average in years	14	6	5
Proprietorships, single, number	976	11	..
Partnerships, single, number	331	23	1
Corporations, single, number	74	5	2
Combinations of firms, number	170	38	27

SOURCE: Tables 24–27.

personal choice, they desire to be executives rather than craftsmen or working foremen. They cannot be full-time executives in a small-sized firm which does not produce enough units to support executive overhead. They must start with a volume of production sufficient to carry at least one executive salary and perhaps more. The medium bracket is the first with volume sufficiently large to afford executive personnel and room for expansion. Their background in business and their performance in building make it possible to speculate that the men coming into this group of builders from outside the industry bring new blood, new vitality, new attitudes, which make them potentially the big builders of the future.[2]

The medium builders are almost equally divided among three types of firms.

First are the old established building firms which, by steady production, have grown to medium size. These often began as small con-

[2] See Appendix D and E, and tables 20, 24–26, 32.

tracting firms. A majority of the medium-sized contractors have this background. In reaching their present size, they have gone as far as they can. Others have turned to operative building and changed in structure as well as type of work.

Second are the firms of former mechanics who started their organizations after the war, with enough capital and enough drive to put themselves in the medium bracket. These are men who know the processes of building, literally from the ground up, and are ambitious for growth.

Third are the firms formed by men from outside the industry, men who have been successful in other businesses (frequently real estate) and, for one reason or another, wish to invest their capital in housebuilding. They are the men with versatile knowledge of other fields and business relationships. They are the promoters for whom the medium bracket is the minimum feasible size.

The medium-sized firms, as a group, are relatively young, with a medial age of six years (table 25).

When a firm gets into the medium bracket, its legal structure becomes more formal and its overhead structure more complicated than in the small building group. Only 14 per cent of the firms in the medium group are individual proprietorships without affiliates, and similarly, 30 per cent are lone partnerships and 6 per cent are single corporations.

A marked characteristic of the legal structure in this group is association of the building firm with another firm in a related field, such as a firm conducting a real estate or land development business. Half of the medium-sized firms in the Bay area have affiliates. Although most affiliates are real estate firms, a few are building materials or trade-contracting businesses. In many instances, this trait of duality stems from the building firm's beginning as an offshoot of a previous business; perhaps more often, however, it reflects an initial attempt to diversify risk and gain certain tax advantages.

The overhead structure of the medium-sized firms is more elaborate than that of the small firms because, in this bracket, the executive duties are so numerous that it is no longer possible for the builder or principal to act as working foreman, even if he wants to. The head man has to lay down his tools, if he is a former working foreman, and become a boss. All firms in this group have a full-time executive. In most

cases this necessitates having an office and an office staff, though in about a quarter of the firms the office work is still carried on single-handedly from the home. Where an office and office staff are used, both are small and frequently share quarters with a real estate business or other sales outlet. In about half the firms, the executive or principal acts as his own construction superintendent, but in the other half a construction superintendent is hired. Even in the largest of the firms in this group, the total personnel overhead rarely exceeds five people (table 20). The medium-sized classification divides in this manner:

In 25 per cent of the firms, the owner acts as executive, manager, and supervisor, with no additional off-site personnel. He hires an on-site working foreman, or, when necessary, foremen.

In 25 per cent of the firms, the owner, in addition to performing these supervisory functions, hires a single full-time office employee, bringing his overhead staff to two.

In the next 25 per cent of the firms, the owner-executive is aided in his supervisory work by a full-time assistant, who may be either an expediter-estimator or a construction superintendent. These firms usually have a full-time office employee, too, so that their total overhead staff comes to three.

The final 25 per cent of the firms have an additional staff member or two handling sales, purchases, and similar functions.

The salaries of overhead personnel for medium-sized firms run, as a general rule, between 2 and 4 per cent of the selling price of the houses they produce.

Equipment is a minor aspect of overhead expenses. The investment in equipment is relatively small, with a median value in the group of $8,500 per firm (fig. 2). This usually includes the personal automobile of the owner or owners, a pickup truck, a power handsaw, probably a full-sized power radial saw, and a few hand tools such as wheelbarrows and shovels. When specialized equipment, such as a bulldozer or heavy truck, is required, it is either rented or obtained by subcontract.

The amount of equipment does not increase proportionately with the size of builder. Additions to equipment over that of the small builder consist primarily of more and larger power tools. Altogether, cost, replacement, and depreciation of equipment are likely to represent no more than $50 in the selling price of a house constructed by a medium-sized builder (table 32).

The amount of plant and equipment investment per unit for these firms remains so small that it is a negligible influence in determining the rate or scale of operations. Capital requirements for equipment are no bar to expansion, and conversely, capital sunk in equipment exerts no pressure for maintaining output.

What is the total cost of overhead in a medium-sized firm? How can an exact figure be determined? Serious difficulties beset the statistician in attempting to arrive at an exact figure reflecting the items in total overhead. These difficulties proceed, primarily, from the form in which the material concerning overhead costs is available.

If statements about efficiency are to have validity, the overhead cost estimates should reflect economic costs and true profits. Data based on accounting records are notoriously poor for this purpose. For many reasons, the lines between economic costs and profits are blurred in the accounting statements studied. The use of the terms "net" and "gross" profit varies from report to report. "Net" may refer to net before or after taxes or before or after withdrawals in proprietorships and partnerships. Similarly, the factors included in "gross" will vary.

Examination of profit-and-loss statements of individual firms shows that the allocation of operating margin between costs and profits is extremely arbitrary. In closely held corporations such as building firms, it is common practice to minimize corporate profits in order to avoid the double taxation of dividends. For this reason, executive salaries in corporations of this type are frequently high and reflect a return on equity and compensation for entrepreneurship in addition to payments for services as executive. This factor does not apply to the majority of firms, which remain unincorporated proprietorships or partnerships. Since salaries and profits are combined and taxed at the same rate in these firms, either may be carried at nominal figures.

Another difficulty arises when firms have affiliates. Prices charged in transactions between affiliates reflect purely bookkeeping decisions. Instead of showing costs as they would be reflected in the market, they may aim at dividing profits so as to minimize either taxes or problems with lending agencies.

Indirect expenses, too, present a problem. In all types of firms there are decided advantages in claiming as expenses as many borderline items as possible, though it is perhaps easier for large corporations to justify claims for personal entertainment, travel, transportation, and

so on, as legitimate "expenses" for purposes of tax deductions. This is another hazard for the statistician who is attempting to combine all actual items of overhead costs into an exact total.

To circumvent these various statistical pitfalls pragmatically, the operating margin—the gross amount between direct costs and selling price—has been taken by this study as the most workable figure for purposes of calculating profit and computing total overhead. We also give some data on net profit, but this figure is even more subject to error and therefore we use it more discriminately.

For the medium-sized firms estimates of operating margins were taken directly from operating statements. A sample of firms in this class showed operating margins ranging from 6 to 31 per cent, with a median of 13.7 per cent of the sales dollar. The distribution was somewhat skewed, so that the mean was 2.5 per cent above the median. These firms reported a median net profit of 8.5 per cent per sales dollar (table 34). When this is subtracted from the operating margin, total overhead, including selling costs, is found to be 5.2 per cent per sales dollar. The arbitrariness of this division is acknowledged.

Financing

Significant changes take place in financing as the scale of housebuilding operations increases.[8] Here the medium-sized housebuilding firms have more problems in common with the large firms than they have with the small ones. This is because they are primarily operative builders, making larger capital investments and taking larger risks, whereas the small firms are primarily contractors whose investments and risks are comparatively minor.

The operative builder must obtain sufficient equity to assume the initial risks of unexpected costs in the construction of the house or unexpected losses in the sale of the house. In addition he must obtain sufficient funds to finance the construction of the house and to enable him to hold the house until it it sold. Finally, he must arrange the purchaser's financing or permanent loan—the so-called take-out money.

These three aspects of financing are, in their general outlines, similar for all operative builders. In this chapter, the manner in which the medium-sized builder meets his problems of equity financing and

[8] See Appendixes E and F.

construction loans are discussed. The third phase of financing, the permanent loan, is examined in the next chapter, which is devoted to the big builder for whom this plays an even more important part.

How do the medium-sized firms raise their capital?

Equity capital, in all cases, is raised entirely on a personal basis without recourse to public financing. No funds are raised through public offering of stocks and bonds. Ownership of most firms, whether they are single proprietorships, partnerships, corporations, or corporate groups, does not exceed four principals. The owners make an initial investment, but in the medium and larger firms the bulk of equity capital has come from reinvestment of profits.

A typical balance sheet (fig. 2) for a medium-sized firm shows $257,000 in total assets, of which the builder's equity or net worth is $112,000. Current assets of $160,000 representing the principal assets used in the production process, consist almost entirely of cash, completed work in place, units for sale, and inventories about to go into units. Total assets include current assets together with equipment ($8,500), real estate and buildings ($30,500), miscellaneous assets ($58,000) such as deposits for water service and other utilities, notes on units sold or from affiliated firms, and outside investments such as savings bonds. Liabilities to others of $145,000 are primarily loans secured by mortgages on units under construction but include amounts owed to all other claimants, such as trade credit and loans secured by notes on the general assets of the firm.

Although equity funds have been adequate for the present operations of builders, the difficulty of expanding equity has been responsible for preventing a majority of medium- and large-sized builders from greatly expanding their operations. Available assets are correlated to volume and do not allow much expansion. Most firms press closely upon their capital ceilings. Because of this, the growth of many of these firms has depended upon their ability to achieve a high rate of capital turnover. When firms approach their capital limits, those making the best use of their available resources most easily increase their relative size.

The ratio of sales dollar to net worth shows the number of times during a year a firm turns over its net worth. In respect to turnover, the medium-sized firms were found to be divided into nearly equal groups, with a third having a turnover rate higher than five to one, a

third having a rate slower than three to one, and the remainder between. Although more than 20 per cent of the large firms had a sales volume more than ten times as great as their net worth in 1949, only 10 per cent of the medium-sized firms were in this bracket. This would indicate that existing equity capital was sufficient for some increase in output if firms increased their rate of capital turnover, but not for much more than doubling it. If we assume that a volume to equity ratio of 10 is close to the maximum, then without new capital, about 40 per cent of the medium-sized firms were limited to doubling their 1949 volume or less, whereas most of the remaining could not have increased their volume by more than three times.

This problem of limited capital makes examination of the ratio of total liabilities to net worth (its leverage) an important means of interpreting the financial structure of a firm. The greater the leverage, the higher the firm's risks and prospective profits. Leverage increases with size of firm. As firms grow larger, they increase their use of borrowed capital both relatively and absolutely.

A large number of medium firms made a high rate of return. In the majority of these, high profits on net worth reflect a high rate of capital turnover with a comparatively high profit on sales. The combination of these two factors gives a high return on capital and appears to mark the most daring as well as the most efficient firms.

The medium-sized firms averaged 23 per cent return on their net worth, and their profit on sales was 8.5 per cent (tables 34 and 35).

Equivalent in importance to equity financing in these firms' operations is construction financing. Financially, the period covered by this study was an exceptional one. Although the problem of construction financing has been the subject of much concern throughout the history of the building industry, it was not, during the period of this study, a critical matter.

The issue of construction financing is traditionally vital to the builder because his unit investments and sales are so large. At any time, about one-quarter of his yearly volume of sales is tied up in partly completed units. Few builders, and no large or medium ones, have sufficient working capital to cover the differences between the rates of their income and outlays. As a result, they must borrow money on various types of security to augment their working capital and aid in bridging the gaps. Borrowings were primarily from financial institu-

tions on mortgages against houses in process, during the period under study.

The summary balance sheets show that less than 45 per cent of the average medium-sized firm's assets at any time are covered by its own equity; in other words, more than 55 per cent of the amount used by these firms is owed to others.

In spite of this proportion of debts, the old picture of housebuilders as an overextended group, who had great difficulties in meeting their current bills and to whom the credit they could obtain from material suppliers and subcontractors was crucial, became outmoded in the postwar period. During this time, most builders had adequate capital or bank credit to meet their trade bills promptly, and in the larger firms they not only frequently furnished financing for subcontractors but also built up sizable inventories of materials. When the current trade payment policies of firms were investigated, it was found that almost all were meeting their bills on a discount-to-prompt basis.

The main influence on construction loans during the postwar period was the government's participation in the financing market. This influence was experienced in three ways. (1) Construction loans were made less risky when the costs of credit to final purchasers, as well as their equity requirements, were greatly reduced, and the government insured lenders against losses if houses could not be sold by the builders. (2) The percentage of value that builders could borrow for construction was increased by government participation. (3) Available funds were increased when establishment of insured loans enabled lending institutions from outside the area to participate more freely in the market.

These effects of government policy and participation channeled from the programs of both the Veterans Administration and the Federal Housing Administration. It was the FHA program which had the greater effect in the construction financing sphere. The Federal Housing Administration gave lending institutions commitments to insure final loans before construction even started. In a majority of cases, these commitments were "firm"; that is, they would be honored either in the name of the builder or any other qualified buyer. This greatly increased available construction funds, since it meant that lenders of construction money were not assuming risks of a deflation in the house market. If the builder completed the house, the govern-

ment guaranteed the lender against loss. The lender risked only a failure of the borrower to complete the house.

From the builder's point of view, FHA-insured construction loans had additional advantages. Conventional noninsured construction loans carry a lower loan-to-price ratio. On conventional loans, builders could borrow only 50 to 65 per cent of value in contrast to a theoretical 85 per cent of value in certain cases under the Federal Housing Administration. Besides the lower loan-to-price ratio, conventional construction loans often carry a higher interest rate to offset the lender's somewhat greater risk. As an additional advantage, according to relevant FHA regulations, the amount of the insured loan could be increased if approval was obtained before construction started and if inspections took placed during construction. These features were so advantageous that more than 64 per cent of the houses built by operative builders in the Bay area were constructed on that basis. The remaining 36 per cent of the operative builders' production consisted mainly of houses built singly rather than in tracts, or houses which, because of their style or price, could obtain only a conventional loan.

The Market

Market problems of the medium-sized housebuilding firm take their configuration from the dimensions of the enterprise.[4] The transition from simplicity in smallness to a more complicated structure in largeness engenders problems of land planning, unit designing, market analysis, and sales techniques. The fact that the transition is incomplete—that the medium-sized firm has not gone all the way to mass production and mass merchandising—sets limits on its possible solutions to these problems.

Solutions are limited by lack of scale. With respect to land, these firms are not large enough to develop whole new areas of their own. In design, they do not have sufficient total volume to afford specialized assistance, and so they must continually imitate designs that are familiar to them. In market analysis, they seldom do any scientific research, and so they rely on guesswork. With respect to sales techniques, these firms do not have the capital to invest in all-out sales efforts, and so they fasten their hopes to underpricing the prevailing

[4] The description in the remainder of this chapter is based on the case studies and surveys described in Appendix D.

market in a familiar area, with a type of house which conforms to the area and to the area's previous experience. All these restrictions confine the medium-sized builder to constructing the most conventional housing produced by the industry. This group, by attempting to create the most salable units at a minimum of expense, operates with a minimum of originality.

The most basic decisions of firms that do merchant building in tracts are those relating to land. The medium-sized firms are the first, in the ascending scale of size, for whom land is of cardinal importance. Except for contractors and the smallest firms within this group, there is not enough land already developed to meet the needs of the medium-sized merchant housebuilders.

Land creates a severe financing problem for a firm of any size, but especially for a firm with capital limitations. Land uses a large part of a firm's equity because unimproved land is usually not considered a suitable security for bank loans, and frequently large amounts of equity are required for financing improvements. This means that the amounts tied up in land are frozen and are hard to thaw for other uses. The carrying costs on land are an important segment of all indirect charges. The costs to the builder—especially the opportunity costs—are high. If builders hold large amounts of land for future development, this greatly diminishes their liquidity. At the same time, if they do not plan their development for large blocks of land they are likely to lose some of the most important advantages of large-scale building. The fluctuations in value of the land may be great. If the cycle is favorable, land may return high capital gains, but if building declines rapidly, the firm's position may be endangered. The only item of equal potential danger is an inventory of unsold houses.

Land development for the medium-sized builders conforms to a typical pattern. Vacant land is usually found in an area where building is already taking place. The medium-sized builders do not develop new communities. Instead, they depend on a ready-made situation, initiated by others, for such community facilities as shopping centers, schools, parks, churches, transportation conveniences, and so on. By having to rely on others for these facilities, they lose part of the profits which accrue to those who develop them. The medium-sized merchant builder usually works on units of from 10 to 50 lots. He often tackles a tract together with other builders of his own size.

The cost of developed land runs from $30,000 to $150,000 a year for builders in this group. About half this amount represents the cost of the raw land. Land must be bought and development planned or begun at least six months, and preferably a year, in advance of construction. It is necessary for a builder to have this much land ahead at all times, because before he can move his construction crew onto a lot, he must have taken many time-consuming steps—steps involving site plans, financing, planning commission approval, line-up of materials, and preliminary work. This means that if a builder's crew is working on a six-month project, he must be actively engaged in the development work on the next project that will follow. For smoothest operations at this level, at least three or four projects a year are desirable.

The matter of keeping ahead of himself in land, if it involves investment of his own funds in raw land and land development, is the heaviest claim on capital confronting a builder. In seeking to solve the problem of land planning with limited capital, builders use several means.

One method to control land for future use without at the same time tying up capital is through the purchase of options. By this means the total tract is divided into segments, each with an agreed price, and the builder takes options upon them which he can pick up as he requires the land. In other cases the owner of the property assumes part of the risk, either by entering into an agreement whereby the builder pays for the developing and the owner receives his payment as each house is sold, or the owner takes back a large mortgage which again is released as the houses are sold. This method is affected by both Federal Housing Administration and state regulations. If a firm commitment is to be obtained, the owner of the land or its mortgage holder must subordinate his interest to the construction and permanent loan. In addition, the builder must be able to give clear title to every house. No house can be sold still subject to a general mortgage on the entire tract. Any of these methods of obtaining the use of land short of outright purchase decreases the builder's equity requirements and increases his potential volume.

Another solution of the problem is offered when a development company takes responsibility for land development, financing, and sales, with the builder responsible only for construction. In this situa-

tion, the builder and land development company divide profits on a predetermined basis which is frequently 40–60 or 50–50, since both carry the burden of the risk of their own equity.

In a third of the firms there is a related land development affiliate. These affiliated firms frequently represent the real estate interests and additional capital of the owners. The duality of corporate existence allows a different sharing of risks, experience, and profits, and in some cases eases the problem.

Still other approaches are based on efforts to have outsiders hold or share the land risks, receiving payment if the ventures are successful.

Some firms which have sufficient money handle their own land purchasing and development. But the prevalence of risk sharing is evidenced by the fact that the median builder in this group actually holds only $750 worth of land per completion. This reflects the complete absence of land holdings on the part of nearly half the medium-sized building firms. Twenty per cent of the medium builders hold a year's supply, and another 20 per cent hold about two years' supply.

The actual physical planning of the land is almost always done by an engineering firm acting as a consultant on a fee basis. This firm is responsible for all plans, required surveys, maps, and so on, and frequently handles all negotiations from the beginning right on through the required approval of the planning commission, sometimes even supervising the installation of utilities. Construction work involved in the land development, such as building roads and sewers, is subcontracted to firms specializing in these operations. This construction work goes on simultaneously with housebuilding except when the terrain requires roads to be built first to get trucks onto the site.

The design of the house usually follows those which have already been completed successfully by the firm. Builders do not know what the consumer wants. They guess. Their guess usually is that he wants what he used to want. The medium-sized builder imitates and copies and offers more of what has been bought. If his guess is right, he is lucky. If his guess is wrong, he goes out of business.

Ideas are often sketched out in rough form by the owner and turned over to a draftsman for final drawings. Some attempt is made to design for simplicity of construction, and to simplify a new design more than its predecessor. New ideas may be derived from reading trade magazines, from listening to salesmen interested in promoting certain

materials, or from observing the work of others. In general, new ideas are incorporated very slowly by the medium-sized builder. He is used to following a certain plan and utilizing a certain material; it has worked and it has sold in the past; he must be thoroughly convinced of the soundness and salability of an innovation. He would rather not engage in experimentation, himself. If the innovation is to be tried out, he would prefer to see it put to test by other builders in the area, and to observe their experience with it before he ventures to depart from his accustomed way.

The sales of the medium-sized builder are usually placed with a particular real estate broker on a special basis or put in the hands of a land development firm. Building firms in this group are almost equally divided in their choice between these two relationships. Since land development for builders of this size is commonly handled by a separate firm, the sales function can easily be performed by this same development unit. Whether the development unit is owned by the principals of the building firm or is an unrelated real estate firm which assumes part of the risk, the building firm, in effect, pays a fixed fee for the job of developing the land, arranging the financing, negotiating with the Federal Housing Administration and Veterans Administration if necessary, and selling.

Some firms may hire a broker and pay a fixed selling fee per house. If there are two or more principals of the firm, one may hold a real estate license and sell the unit himself. Or, finally, a firm may furnish office space to a real estate broker who handles the firm's sales on a special fee basis while conducting his private business on the firm's premises. Only the smallest firms of this group pay a regular brokerage fee for sales.

As a sort of substitute for market research, medium-sized firms often test the market by selling from a model home. The objective is to make sure that there is demand, and that the builder is not ahead of the market. The difficulty is that the builder has to plan the whole project in advance, and has to be working on it while the model home is in construction and while the sales effort is under way. The model home does test the market, but the builder is frequently so committed that he could not back out, even if the test turned out "negative," and sales very slow. The chief purpose served by the model home technique is that the sales effort can be begun sooner, with the result that later homes may be sold before their construction is completed.

Production

The medium-sized firm is at the halfway mark of expansion in the manner in which it organizes its production as well as in most other aspects of its operations. It continues to perform primarily carpentry work, subcontracting out the rest of the production processes. Thus the surface organization of production is similar to that of the small firm. The same tasks are still performed by the builder's direct labor; the same jobs are still subcontracted; and materials are bought with about the same degree of finish. The internal organization of production, however, begins to show some similarity to that of the large firms. This is seen particularly in utilization of labor.

The medium-sized firm's labor force is still small, averaging 15 mechanics (table 12). These are divided into four crews, each of which does only one of four major jobs—foundation, framing, walls, and finish. Their specialization begins and ends here. Within each crew, there is virtually no specialization. All members, for example, of the framing crew pitch in to do whatever is needed to build, raise, and place the frame.

When firms reach this size of operation, their labor relations become somewhat more formal. They have more turnover of men, with the result that they have to hire those available in the labor market, probably taking whatever carpenters the union sends them. This makes the relations less personal, as well as less permanent, than those of the small builder and his crew.

Since it pays to keep labor turnover as low as possible, medium firms try to plan their rate and system of work to fit and hold onto permanent crews. These firms try to maintain a steady production schedule. Crews must be scheduled in proper rotation. A crew works on a group of three or four houses, and then the next crew moves in to work on that group, while the first crew goes on to another group. If the schedule does not permit retaining a full permanent crew, these firms always seek to hold at least four or five crew leaders. To do this, they may have to slow down work and delay completion of units. For example, if a firm has enough work to keep 16 men busy for a week, it has enough work to keep four men busy for a month; therefore, if a gap occurs in the production schedule, the firm, instead of using 16 men for a week, may let four men do the job in a month, in order to keep

the four crew leaders permanently on the payroll. The increased carrying costs and less liquid capital imposed by the slower rate of work may be compensated for by better efficiency resulting from utilization of men whose skill and reliability have been demonstrated.

In addition to increased specialization of crews, medium firms also use better and more efficient techniques. Among new techniques, precutting and preassembling are becoming increasingly common, though prefabrication is virtually nonexistent. As pointed out in the preceding chapter, the term prefabrication is used here to designate the assembling of a complete wall or final unit in some type of centralized manufacturing process, with the unit brought to the site ready for final erection. Many firms of all sizes attempted prefabrication in the postwar period. Currently, all but two have either gone out of business or returned to the usual amount of precutting.

In precutting, lumber is usually sawed to predetermined lengths by some type of power machinery. The lumber is placed on a saw table where it is forced by hand against a stop at the desired length from the fixture carrying the saw. The mechanism can be extremely simple. The stop is usually just a piece of lumber or a nail set in cuts which have been made at fixed distances along the table. The setting can be changed rapidly for each desired cutting. The fixture includes either a large-sized radial saw or the simple power handsaw (Skil). Other types of precutting use angle cuts made either with a pattern or by setting of the saw to cut at a given angle.

This cutting may take place immediately adjacent to the house site, or in a builder's yard, on or near the tract but at some distance from the site where the lumber enters the house, or in the yard of the materials dealer.

Cut pieces are either tossed directly to the work point on the house or, if cut in a yard, are binned and distributed later. They may or may not be numbered and marked individually, depending on the complexity of the operation.

In preassembling, lumber or other materials are placed on jig-tables where the jig outlines the desired pattern, and the pieces are nailed together. The units are placed in piles from which they are distributed to the individual house site either by trailer or skid. They are then incorporated into the house in a manner similar to other units.

The amount and type of precutting or preassembly vary greatly

from firm to firm. Most small firms use precut main items, such as studs and headers. As the size of a project increases, more and more items tend to be precut, until at the maximum almost all lumber is so handled. Ultimately, only the plates, subflooring, and sheathing are left to be sawed during erection. The question at this stage is simply one of whether it is easier to cut an item before fitting or after fitting.

The amount of preassembling is less correlated with size than is precutting. Some firms do almost no preassembly work, though certain units such as cabinets and garage doors are bought ready-made from the dealer. Other firms preassemble such wall sections as openings for windows and doors; sometimes doors are fitted to the jamb, and entire window units, including decorations and window boxes, may be preassembled also. The shop preparation of sheet metal for all units is a somewhat similar operation. Finally, some firms preassemble the complete framing for a wall and move it to the site.

Specific procedures are determined by variations in particular cost factors. Precutting is adopted because of the advantages of power over handsawing and mechanical over handmeasuring, because of the great saving of time and materials through repetition and proper planning of cuts, and because of the increase in labor output which results from setting work standards.

Disadvantages also exist. Precutting requires some increase in the cost of handling and transportation, since items must be classified, binned or stacked, counted, and distributed. There is also an overhead cost in the purchase and maintenance of equipment.

Similarly, for preassembly, when measurements are made and lumber is marked mechanically, repetition sets in and work standards can be established; but the problem of transportation is accentuated because the assembled units are awkward and must be handled with some care.

The total procedures of the firm will determine the relative efficiency of each method. The increased speed that comes with repetition and use of a pattern can rapidly be offset by larger handling costs. Depending upon the general methods of the firm, its scheduling ability, and its available labor and supervision, builders of similar size will find different systems more efficient at different times, and a single firm may change its methods as its supervisors and labor change.

Improvements similar to those of precutting and preassembling are

brought about by the use of patterns and templates. These add the related economies of demonstrating the most efficient cuts and utilization of surplus cutoff ends to the time which they save in measurement.

The simplest type of template is that employed in marking off the position of studs, doors, windows, and the like. These are simply bars approximately six feet in length, with crosspieces the width of the stud, and possibly other standard distances marked off. With this template and a crayon, a man can rapidly indicate the exact location of each stud on the plates. When he is familiar with the plan from previous experience, he can also indicate the proper location of all necessary openings and cuts.

Once constructed, the template reduces the problem of exact measurement for each house. Templates are often used for laying out foundation forms, and they can indicate the location of the interior position of the fireplace, porches, and so on.

Templates may further be used in hanging doors to show the correct location of the hinges and hardware. In this latter case, the template is a rod fitting exactly into the jamb, with spaces of the right size cut out at the right spot for hinges. It is nailed temporarily against the jamb and furnishes a guide for routing. After a number of jambs have been routed, the doors can be treated in the same manner.

Since templates change from plan to plan, they cannot be used in scattered building. It is not worth the time and overhead to make, store, and then search them out for intermittent use on individual houses every few months.

A pattern is invaluable when a large number of pieces are to be cut or notched. For example, roof rafters have to be sawed to meet the ridgepole at the proper angle, and notched to fit properly over the top plate. The cuts can be made with a minimum of measurement on the saw table or marked off from a pattern and cut with a power handsaw at the site.

As his scale increases, the medium builder gains increased opportunity to use these timesaving procedures. They mark important improvements in technique, but unfortunately they cannot be fully utilized until a builder's size is large enough to employ better production planning and controls than the medium-sized builder can. Before that point, some of these new methods aid in reducing his costs, but large potential areas for improvement still remain.

Purchasing

Salient organizational changes in the transition from small to medium-sized building operations occur in materials supply. Here there is tangible evidence of increasing economy and efficiency commensurate with increasing scale of production.

It is in the medium-sized group that wholesale buying, discount prices, and direct purchases of materials from mills become common. The medium-sized builder is ordinarily able to by-pass the retailer. He does not require the usual dealer's services which were valuable to the small builder. This builder buys the same four items that the small builder buys, but usually he is able to take advantage of his larger-scale operation to obtain lower unit prices for quantity purchases.

The medium-sized builder almost always buys his lumber and hardware at wholesale or at a wholesale price. He usually obtains his millwork and cabinets from a specialist and receives a quantity discount. Gypsum is his greatest materials problem, because it is the most closely controlled of the materials. On gypsum, some medium-sized builders obtain a discount, and some do not (table 23).

Very few medium-sized builders are directly affiliated with a supply source, but the simplification and economy of wholesale and quantity discount purchasing represent an important innovation at this level in the scale of housebuilding operations and indicate marked increase in efficiency.

The medium-sized builder shops around, since quantities are large and small savings per unit add up, so that he may choose the yard, broker, or wholesaler whose price is best. Because of the amount of each order, he has more bargaining power than the small builder. Whole channels of distribution may be cut out because their services are no longer necessary.

Illustrative of savings resulting from increased scale is the comparative cost of lumber purchased at retail and at wholesale. In January, 1951, the single-house builder was charged $97 per thousand board feet at retail, though the wholesale price of this lumber on a Bay region siding was about $82 per thousand. Most medium-sized builders who produced as many as three houses per month purchased through a broker or wholesaler at the lower price. The larger ones among them

who bought direct from the mills saved an additional 5 per cent. Similarly, millwork which cost the small builder $725 for a typical house cost the medium-sized builder $580; hardware which cost the small builder $185 could be bought in quantity by the medium-sized builder for $155. In sum, the medium-sized builder saved about 14 per cent on all of his direct materials purchases (table 51).

Another economy, and consequent increase of efficiency, made possible by the medium-sized builder's greater volume of production is found in his relation to subcontractors. The number of subcontractors used by the medium-sized builder does not differ because of his larger scale from the number used by the small contractor. He still enters into from 10 to 15 subcontracts per house (table 22). The important change in the medium-sized firm's relationships with subcontractors is that this firm has acquired bargaining power and has begun to use it to make savings and thus to increase efficiency. The builder's subcontract charges are reduced by sums equivalent to the savings he makes possible for his trade contractors. These occur in four major ways (tables 49–52).

First, the subcontractor in medium-sized tracts saves by more efficient use of labor. The largest reduction in labor cost comes from decreasing lost time rather than from changed techniques and methods. Except for painters, the amount of labor each subcontractor furnishes to a given unit is not large. At the same time, in several trades this small amount may be spread over several visits. This means that for jobs in scattered houses, the ratio of nonproductive time—time spent in getting to the house and getting equipment out and set up—to productive time is high. Further, when jobs are not an even multiple of the working day and the amount of time left is too short to move to another location, the men will tend to stretch into a full day's work the job they have in hand. An example of this may be taken from masonry. In ceramic tiles and masonry, the labor cost for a small builder's single house is often estimated as two full days' wages for a mason and his helper. The work could be done more quickly, but doing so would not leave enough time to move to a new location, start preparations, mix mortar or mastic, and accomplish any work. On the other hand, for a medium builder's small or medium tract, if two houses are worked in a row, the time saved in setting up and preparation usually allows the two units to be completed in three days instead of four—a labor saving of 25 per cent.

Second, subcontractors' savings in materials purchases occur when a tract project is large enough to permit buying in bulk quantities. As quantities grow large, the trade contractor can buy in carload lots or in standard packages, which means lower prices. For example, for the typical house in a medium-sized builder's operation, oak flooring costs \$198 that would cost the small builder \$224; plumbing materials cost \$450 that would cost the small builder \$495; paint costs \$135 that would cost the small builder \$144. Savings in purchases of trade contractors' materials for the medium-sized tract come to 6 per cent.

Third, the medium tract saves for the subcontractor by making more accurate his estimating, scheduling, and production controls. On a tract, the subcontractor knows just what to expect and can plan and pace his work more efficiently because the work is similar from one house to the next. Furthermore, he can afford to spend more time on his planning, thus doing better, more economical planning. On an individual house, each subcontractor's task is too small to allow for detailed thought and supervision.

The fourth cost-saving feature of increased scale is a sharp reduction in the trade contractor's charges for overhead and profit. The medium-sized builder is charged about \$100 less by his subcontractors for overhead and profit on the typical house than the small builder is charged. As one example, the plumber's overhead and profit charge to the small builder on a typical house is \$200; to the medium-sized builder it is \$148.

There are three main reasons for these reductions. Because overhead and profit are some type of function of the payments for materials and labor, since magnitudes of these amounts determine necessary capital and supervision, payments for overhead fall at least proportionately with the fall in direct costs. The amount of estimating, supervising, purchasing, and bookkeeping time required to handle a large job is less proportionately per house than that required for a small one, the amount of effort spent on each task being spread over more units.

And because the medium-sized builder is able to make savings for the subcontractors in the four ways described, and offers larger volume, the subcontractors are willing to take lower profits. Subcontractor competition for jobs of larger volume is sufficient to cause them to pass along to the builder the savings which the builder has made possible, and they often go beyond this by shaving their own profit margin.

In a highly competitive situation or when building is slow, subcontractors may cut their profits to nothing, simply to go on working and to retain their permanent crews.

The medium-sized builder has not actually introduced any new methods in his trade contractor relationships. No real changes or improvements in the system of subcontractual relations or the subcontractors' methods have taken place. The difference from the small builder is one of degree rather than one of kind. The medium-sized builder's advantageous position derives from greater volume of production.

The control by medium-sized firms over their subcontractors' work remains slight. These firms are not large enough to plan subcontractors' methods. They do not have time. All their available time must be spent on controls of their own direct operations. Such supervision as there is by the builder is handled informally. In their relationships with and dependence on the ability of their subcontractors, the medium-sized firms are not very different from the small firms.

Controls

The transitional position of the medium-sized builder is seen again in his methods of estimating, accounting, and controls.[5] These methods differ somewhat from those of the small builder. The differences arise mainly from the operative nature of his work and his increased volume of production. The medium-sized builder must work out a preliminary budget covering total tract costs, since his projects are speculative. He usually sets his selling price before he knows his actual costs. In addition, his estimate, based upon one house, must show the total quantities of materials required for the tract as well as funds necessary for all purposes.

Estimating in this manner enables him to decide what bulk purchases of materials should be attempted, and to budget his total financial requirements more completely. His capital must be carefully rationed to the most profitable uses. The medium-sized builder is also required to organize his time more comprehensively in advance than the small builder. His work is done in groups—he may have several groups of houses under construction at once—and he must be able to schedule his foundation, framing, wall, and finishing crews, as well as

[5] The description in this section is based on the case studies and surveys described in Appendix D.

purchases and deliveries, in the proper sequence. If he produces 50 houses a year, he may have four groups of 4 or 5 houses each in various stages of completion at the same time, and the efficient rotation of his crews necessitates detailed preliminary planning as well as close supervision.

Medium-sized firms frequently have a small yard and warehouse, which require a simplified inventory system. A purchase-order plan is likely to be used. Accounting for supplies is on a more formalized basis than is that of the small builder. Here the group is the accounting unit. Deliveries are checked in at either the yard or warehouse on duplicate order forms and are reported to the bookkeeper. Materials are charged to a group of houses. Labor and overhead are also calculated on a group basis. When the total costs for the group of houses are tabulated, they are then allocated back and prorated to the individual houses.

Although some kind of production schedule is necessary, it has been difficult for builders to work out a completely satisfactory system of suitable and inexpensive production controls. Most firms make time estimates when they start a project and then depend on personal supervision to keep up their labor effectiveness. Completed work is posted to a chart. In addition, progress payments and required inspections for each house are recorded on the chart. These serve as bench marks and proof that the work has been completed. The charts show progress at about eight stages for each house. Any delay in schedule can be checked.

Labor is accounted for by the foreman of each crew, who records by timecard the hours expended on each group of houses. The time is then charged accordingly, the group again being used as the accounting unit. This is a compromise between the expensive ideal of accounting for labor on each house and the dangerous short cut of calculating labor costs only when the whole project is completed. This system permits the cost per crew per phase of work to be calculated as soon as a group of houses is completed. The result gives the executive a set of figures that he can use for control purposes. He checks the actual work figures against his original estimates and if the standards that he set up have not been met, he finds out why.

Subcontractor payments and incidentals are charged by medium-sized firms (as is also true with small firms) directly against particular units. When all direct costs have been tabulated for the group of houses that make up a given accounting unit, the results are compared

with selling prices, and the difference is the gross margin on sales. From this gross margin, indirect construction costs such as supervision and depreciation and all other overhead expenses including office salaries, sales costs, licenses, and the like are then subtracted to give the profit per individual house.

The controls are actually the minimum necessary to keep this size of builder from losing control of his operations. Doing a half-million-dollar business, he obviously must have improved his accounting methods over those of the small builder. At the same time, the controls rarely are sufficiently detailed to aid him in production planning. His assignment of crews, checking their work, and determination of production methods remains almost entirely on a personal and hit-or-miss basis.

Determination of Size of Firm

The medium-sized firms have already made the transition from small size to a more complicated structure. If they are to expand further they must meet and solve an entirely new and different set of problems. They have passed the hurdle of the owner's laying down his tools to become an executive; the principal of these firms is already an executive. Changing the nature of the operation from contracting on individual houses to operative and tract building is behind them; the majority of these firms are already engaged in operative and tract building. Only about 20 per cent claim that their expansion is limited by managerial span; that is, a reluctance to bring in an additional principal or executive (table 21).

Credit, risk, and land present the prevailing impediments to further expansion and of these, credit is the most common. This usually means that the firm is already pressing the limit of extension allowed by the financial institutions. It might desire to expand but does not have the working capital to make this possible.

Among that half of the firms who do have some funds available for enlargement, the lack of suitable land or the fear of overexpansion—in some cases both—are the prime deterrents. As has already been indicated, these companies have a difficult land problem because they need large amounts and yet cannot develop entirely new areas. Those firms which are building for others, such as separate land development organizations or property owners who assume the risks, are dependent for their rate of expansion on the risks the others are willing to take.

To go into their own land development would require a very substantial addition of capital. It would also require a readiness to tie up the additional capital in a slow-moving asset, one on which banks are not willing to make loans, and one which is hard to thaw for other uses. Further, it would subject the additional capital to serious risks because the value of land is susceptible to extreme fluctuations. Hence, even the firms which are not tightly pressing their capital limits are hesitant to freeze their available funds in an investment which is hard to liquidate and is subject to market hazards.

The risk element in expansion plays a determining role in the decisions of many firms in this bracket. They have kept their overhead and invested capital comparatively low and enjoy the resultant feeling of security. They are not eager to jeopardize it through expansion.

Increased production frequently requires a jump of many units; it is not possible simply to add one or two houses a year to output. This discontinuity in the production curve means that firms which appear to have more than ample resources at their present level still do not have enough to bridge the gap to the next feasible size.

Summary

The evolution of the housebuilding industry can be observed in the structural and organizational changes in the medium-sized building group, as compared with small builders. Starting with the small builder, the change which has taken place in the medium-sized bracket is introductory to the development of the big builder. The medium-sized builders mark the mid-point in the development of the housebuilding industry.

The production median of this group is the production median of the industry. At the lower end are the contractors, a minority which appears to be at a dead-end of production development; at the higher levels of this group are the operative tract builders, and this majority evidences the genes of greater growth.

The men who compose the firms of this latter group are businessmen first, then builders. They bring to building the vitality of new business attitudes and methods. They form partnerships and corporations. They affiliate with firms in related fields. They establish themselves as executives and develop overhead structure. They meet the challenge of more complicated financing problems and greater risk. They supply sufficient equity capital to finance the house from the

ground up and hold it until it sells. They secure construction loans and arrange the permanent loan for the final consumer. Their leverage is greater than that of small firms; their turnover is more rapid. They reap the reward by averaging 23 per cent return on their net worth, compared with 13 per cent among the small builders.

They are confronted by a new set of market problems—land planning, unit designing, market analysis, and sales techniques. To meet these, they adopt some, but not all, of the methods of mass production and mass merchandising, but they do not innovate. The result is the most conventional product of any class of builder.

The first steps toward mass production are seen in some specialization in organization of the labor force and off-site fabricating. The first steps toward the economies of mass purchasing are seen in wholesale buying, shopping for discount prices, and making direct purchases of materials from mills. The first steps toward increased bargaining power are utilized to gain lower prices from subcontractors.

Estimating, accounting, and controls have become more complicated for the medium-sized builder. More budgeting, planning, scheduling are required for production of groups of units than for single units.

At the same time, the inability to support any sizable overhead staff keeps these controls at a minimum. These controls serve a negative rather than a positive function. They guard against depletion of money at crucial times and against too lengthy waiting periods and delays for the crews. They do not, however, enable the builder to plan and control more efficiently. Primarily he is still using the same methods and techniques as the small builder, though he has gained some purchasing and other advantages which arise with scale.

The medium-sized firms could become more efficient and more profitable if they could carry their incipient organizational and structural adaptations from the present rudimentary stage to a maximum evolvement. This is impossible with their present scale, however, because this higher organization would require larger indirect expenses than could be carried efficiently by their existing volume. To achieve a higher volume would require an altered organization and more credit, more capital, more land. If these become available, some builders will attempt to move up, whereas others, who are satisfied with their existing size, will not take the additional risk.

5

The Large Firm

At the top of the housebuilding pyramid is that group of firms whose number narrows to smallest though its production rises to highest. There are only thirty firms in the classification of Bay area businesses which produce more than 100 houses a year.[1]

The big 30—representing but 2 per cent of Bay area builders—constructed 6,195 houses in 1949, or 35 per cent of all units produced by the industry. These are the new giants in an industry once populated by pygmies. Here, at the very peak of the pyramid, are the leaders of construction who are not content merely to build houses. They construct communities (table 10).

These firms personify housebuilding's answer to the dynamic pressures at work in the past decade. They have developed new techniques, new processes, and new forms of organization in response to a new market situation. The metamorphosis of the market came about through a tremendous demand kindled by easier financing and the big backlog from the war, when new housing production fell far behind new family formation.

It is true that these firms would not be considered colossal if they existed in the automobile or steel industry or other areas of manufacturing titans. They are mammoth, however, in relation to the industry's past history, the type of market in which it operates, and in their method of organization.

Their silhouette shows that they have developed in a rather lopsided manner. They too are still in transition. What they required for success in the postwar market was, primarily, skill in purchasing and financing. In this direction, they overspecialized. They under-

[1] See Appendixes C and F, and tables 10–17, 38, 39.

specialized in such directions as production management and design, elements which the market did not require them to develop to any great extent. Their imbalance faces them with serious problems both of present efficiency and future progress, giving rise to the question of whether these firms took advantage of their position to make the most of their potentialities while the market was most favorable to their growth. What of the present and the future? Is it probable that the best aspects of present operations will spread from the large firms to most other firms? Will the large firms continue to develop as they move into a future of more competitive conditions? This chapter does not attempt an easy "yes" or "no" answer to these questions. It is hoped that the description of the large builders' operations, structure, and organization will suggest tentative answers to the reader.

The large firms are all merchant builders in type, producing the bulk of their units in tracts by operative methods. Only two firms in this group built more than one or two houses on individual contracts, and in both instances the amount of contract work was minor. Only six firms in the group did any building in addition to houses. Three of these were general contractors who did all kinds of building; for two of these three, housebuilding was only a sideline furnishing a small part of their total volume (tables 10, 13–16).

The three other firms which erected units other than houses built multifamily and commercial structures. Most of this building consisted of their own shopping centers and apartment houses in or near their own main tracts. This work was part of the construction of a complete community.

There was appeal to all large builders in the rich potentialities of creating a whole community—particularly of capturing, through commercial development, the enhanced values which they brought to an area by their own construction of houses. At the time of our survey, many large firms planned, or had already completed, such commercial developments. Consequently, though they remain housebuilders, the number of firms doing this other type of building varies from year to year.

The total dollar volume of business produced by the large firm in 1949 ranged from $1,000,000 to $5,000,000, though three of the concerns fell just below the bracket and four topped it. None attained the maximum size of $25,000,000 to $30,000,000 in annual volume

achieved by housebuilders in a few other areas (table 11). (It was possible, however, to draw upon some of the experience of those still larger firms in parts of the discussion which follows.)

Most large firms concentrated their building in the nonurban or small suburban parts of the metropolitan area. Even the few firms which found sufficient land to develop within the major cities usually had other and lower-priced projects in the outlying districts. Operation of two or three tracts in adjacent sections was rather common. Half the large firms built in two or more permit centers. Because several of their tracts were in near-by counties beyond the census boundaries of the area, 20 per cent of the units built by the large Bay area firms were on land outside the official limits of the Bay area. This tendency to spread out, however, did not represent real dispersion. Almost all tracts were within an actual economic market. Only rarely did firms work on sites more than 15 to 20 miles apart (tables 10, 17).

It was the large firms which built the least expensive houses. The median-priced house sold by these firms in 1949 cost the buyer $9,250. This compares with the median price of $12,400 for the small builder and $10,500 for the medium-sized firm. The large builder's houses tended to be stripped of all extras, and their merchandising was pointed toward the mass market. Besides their skimpiness in quality and detail, they were frequently built on newly developed land of the least expensive kind (tables 38, 39).

The large builders' concentration in low-priced houses was not exclusive. A few firms did build houses in the higher price brackets, though in most cases they also worked in the cheaper, more active market.

"Mass" is the key to most of the operations of this group of firms—mass production and mass merchandising for the mass market.

Background and Organization

These tallest trees in the housebuilding forest have, as a group, the deepest roots in the building business. The average age of the large firms is 15 years—nearly three times that of the other groups. This average is somewhat misleading, however, because the age distribution is U-shaped. Half of the large firms were flourishing before the war. Most of these had been started in the 1920's and had had the stamina to survive the depression. Several stem back to the century's first

decade. The other half, however, are new shoots, born of the war and the postwar boom (table 25).

The older firms had developed gradually, building up their experience and capital over the years. They had grown to medium size, and in a few cases, to large size, before the war began, and were in readiness to expand to meet the new demand.[2]

The newer members of the large group had originated, in many cases, as medium-sized firms. The owners of these firms frequently came to building from a background of real estate or financing which helped them to recognize the opportunity and need for development of large-scale firms. These men either had capital of their own or attracted partners who could furnish sufficient funds so that it was not necessary for them to start as small firms and grow gradually. At the outset they were able to hire construction superintendents to handle technical details, and they, as principals, undertook executive and supervisory duties. Several of the postwar firms were formed by younger men who had been trained in engineering or other professional fields which enabled them to bring fresh and original ideas to the business of house production.

It is these newest members of the large group who have shown the most dynamic growth. They are the ones most willing to take greater risks and to operate on lower equities. They are the ones who often bring invigorating new concepts—or new applications of existing practices in other fields—into housebuilding. They are often the innovators for the industry. Often, growth of their firms has been accelerated because they have reinvested in their businesses most of their substantial profits.

The owners of the large firms are slightly older than are the principals of the smaller firms. Their average age is 52. These extra years signify extra experience. The owner may have grown gray with his firm, steering it through the vicissitudes of the depression and recurring business cycles, in the case of an old and well-established business; or, in the case of a newer building firm, the owner may be a veteran of another profession—banking, savings and loan, real estate, retailing—and bring to building a knowledge of other business techniques (tables 24, 26).

Only 40 per cent of the owners of large firms have worked as build-

[2] See Appendixes D and E, and tables 24–27, 32.

ing mechanics. This experience frequently consisted only of work for their father or another relative who was the firm's founder. In contrast with this traditional path of entry were those with a general business background, and a final 20 per cent who were graduate engineers.

The operating structure of firms building more than 100 houses a year becomes much more complex than that of firms with a smaller volume of production. Multiplication of business entities is characteristic of operating structure in this bracket. The average is nearly three legal entities per large-sized builder. Apparently builders at this level find that it pays to multiply corporate units in order to spread the risk and also, probably, to solve certain problems connected with taxes, with building supply, and occasionally with union restrictions.

Forty per cent of the large firms have more than two entities, and the very large ones usually have five or more related corporations. The 30 firms in this group actually perform their functions through at least 80 separate corporations, partnerships, or proprietorships. A maximum of 10 to 15 companies in a single group occurs in several cases in the Bay area, but this is still a small figure compared with the forty-three corporations with which the 1951 national president of the Homebuilders' Association is credited (table 27).

The uninitiated might inquire as to what separate functions so many different firms could perform for what is, essentially, one business. A large combine might consist of the construction company itself, a real estate and insurance firm, several firms handling individually the land development for each separate tract or subdivision, several realty firms each owning and operating a separate apartment house or shopping center, one or two trade-contracting firms, a materials-supply firm, and several materials-producing units such as millwork firms and lumber mills.

These cases are unusual, as is evident from the median. The most typical operation is corporatively divided three ways: (1) construction; (2) land development, property ownership and management; (3) building materials and supply. It should not be supposed that each corporation requires separate personnel. Usually the separateness of the corporations is a convenient legal fiction. Each member of the main firm dons the hat of a given corporation, as required, from time to time. Except for accounting and other financial considerations, little effort is made to divide the actual workings of the individual units.

The main firm in a typical large-scale operation frequently has from two to four principal members who assume the primary executive positions. Although some single-ownership firms do exist, most companies have several nearly equal owners active in the business. This coöwnership allows an active part in management to the men who furnish funds, thus facilitating raising capital.

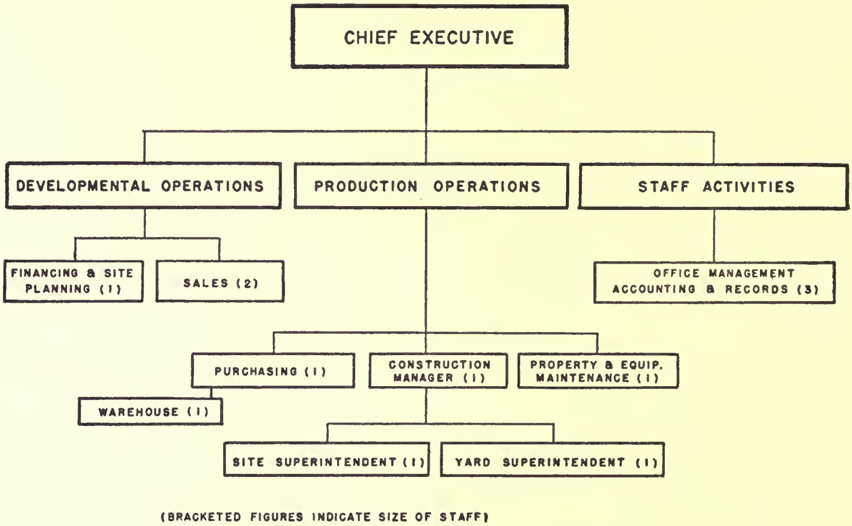

Fig. 6. Typical organization of large firm.

A total of thirteen off-site or supervisory personnel is average in the group of firms producing between 250 and 300 houses annually. There is little formality in either the organization or business procedures of these firms. The relatively small size of the management group encourages personal contact. Few, if any, special organizational techniques are used.

A typical pattern of organization for such firms operating in the Bay area is charted in figure 6. The figure shows the allocation of duties among the dozen supervisory personnel. The duties allocated are those which must be accomplished in operations of any size. In small firms all are performed by a single person. In these larger firms they are fragmented, with the division of work depending upon the skills possessed by the particular executives of the firm.

Ordinarily the chief executive administers the over-all operation. His two main assistants—or the other principals in a multiheaded firm—handle the production operations including construction management, and the remaining line functions such as planning of tracts, financing, sales, and purchasing. Staff duties, such as office management and records and accounting, can be handled at a subsidiary level. The decisions requiring executive skill as well as some vision are the forward planning, negotiations for important purchases of land, materials, and trade contractors' services, and frequently dealings with financial institutions and particularly government agencies. Certain functions of the typical firm of this size, such as design, estimating, and production control, do not appear in the chart as specialized supervisory functions because they do not have individuals assigned to them.

The firms that have widened their scope to do general contracting or community development have a somewhat larger overhead structure, necessitated by their larger dollar volume of building and by the increased functions they perform. When firms add functions and reach a building volume of about $5,000,000, their overhead staff expands to approximately 50 people.

The general organizational structure of these largest firms remains practically the same as that shown by the chart for the 250- to 300-house firms, but all sections are expanded. The supervisor in charge of staff activities has a much bigger job. His is now an executive function. The office unit handles rental matters for the shopping center and apartment units. The record-keeping functions expand and become a full-fledged business operation. The task of keeping track of funds and equipment is greater. The amount of correspondence and the number of tax and financing problems increase. A larger maintenance crew is required. The general office staff averages about 15 people in these larger firms instead of the three shown in the figure. The sections under developmental operations assume greater importance, particularly planning. Advance land planning, design, and estimating work become so voluminous that the firm performs many of the related functions itself rather than farming some of them out to consultants on a fee basis, as is common among the smaller large firms. The planning section includes estimating, drafting, and architectural design, and requires about five men, one of whom has professional responsibilities. The purchasing and warehousing sections may have

as many as seven men between them instead of two. This is accounted for partly by the increase in volume and partly by reason of more bulk purchases further back along the distribution line; more time is spent at the mills and in finding alternative channels of supply. The sales force expands proportionately for similar reasons.

Overhead on production operations is obviously increased as well. Here the problem is simply one of performing a larger volume of work in more areas, but personnel increases more than proportionately. Although one might expect expansion in production overhead personnel to be approximately equivalent to the expansion in scale of operations, a disproportionate increase takes place because production has spread beyond the area of simple visual control by the owner or owners.

The personnel for supervision of construction for these largest firms increases to a total of 11 men from the three—the construction manager and two superintendents—noted on the figure for the average large firm. These 11 men include a construction manager, three superintendents, four assistant superintendents or nonworking foremen in charge of specific types of operations, and three timekeepers and production-control clerks. Although the number of supervisory personnel more than triples at the same time that the volume only doubles, the supervisory payroll may expand dollarwise simply in proportion to volume—in other words, may only double. The reason for this is that the three original supervisors required by the average large firm must be of high caliber—one probably an owner or executive and the others either drawing high salaries or working on a bonus basis—whereas the new men added by the very large firm draw only foremen's or clerk's wages. Consequently the salaries of the additional eight may aggregate no more than those of the first three.

The overhead cost per dollar of sales may not increase in these larger organizational structures, even though expansion brings about a somewhat incommensurate growth in the number of overhead personnel as compared with output. This is a consequence of the largest firms' capacity to spread a few high-cost executive skills over more units by adding a larger number of low-cost specialized personnel to assist them.

The economy of spreading overhead costs over a larger number of units is particularly noticeable in respect to equipment. The big

builder uses the least amount of equipment per unit of all firms. The average big builder owns $17,500 worth of equipment. His investment in equipment represents an average of $60 per house he completes. The amount of capital used, equipment-wise, per unit has fallen below that used by the medium-sized and small builders (table 32 and fig. 2).

The large firms have not taken advantage of the opportunity available to them of appreciably adding to their machinery as their scale has increased. They simply add more small and inexpensive power tools rather than shifting to more complicated and costly machinery. The most substantial increase in equipment is found in a few examples of materials-handling machinery acquired by the largest builders, but even these are rare. Other tools and machines used by the large builders are about the same as those employed by the medium-sized firms.

In this, housebuilding differs from many other industries. It is a common industrial pattern to find that as size of firms increases and individual operations become more specialized, new types of equipment are devised which perform these operations more efficiently. Many observers have believed that the failure to develop more costly specialized machinery in housebuilding was due to the inability of small firms to spread its costs over sufficient units. Whatever may have been the truth of this observation in former periods, it is obvious that it does not apply to the large builder of today. Other explanations must be sought. Perhaps housebuilding is simple enough not to require intricate specialized equipment. Building firms doing general contracting have far larger investments in plants and equipment. Apparently the more complex structural problems of large buildings have led to a greater stress on modern methods and machinery in the commercial building field. Perhaps the small investment by housebuilders follows from a desire of the firms to sink as little capital as possible in overhead because of the risks of fluctuations in housebuilding demand. Certainly the existing investment in equipment is so small that the need to obtain a return on it exerts no pressure on firms to maintain production. In contrast to other industries, large housebuilding firms can disregard the problem of fixed costs if they wish to remain idle.

The task of ascertaining the exact cost of the expanded overhead of the large housebuilding firms is again, as it was with the medium-sized firms, a matter of correctly translating accounting costs into true economic costs. The total reported operating margins of these large firms

average 18 per cent—the difference between their direct costs and their selling prices. In a necessarily rather arbitrary division, 10 per cent of this is assigned to profits and 8 per cent to overhead. It must be recalled that some additional amounts properly attributable to the operating margins of these firms may actually be shown in affiliates, since assets transferred between affiliates will be carried at nominal prices not necessarily expressing their actual economic value (tables 34 and 49).

Financing

If total assets had been used as a measure in categorizing Bay area housebuilding firms by size, large firms would have been defined as those with assets of more than $600,000. This method of classification would have increased by 13 the number of large-sized firms, because the largest of the medium-sized housebuilders and a few general contractors who built fewer than 100 houses a year have assets surpassing $600,000. This classification would also have transferred out of the large group seven firms which actually completed more than 100 units but had assets of less than $600,000 (table 28).

To use this figure as a criterion of bigness would appear preposterous in many industries. Part of this nonconformity to industrial pattern is based on the local scale of housebuilding, and part reflects the relatively small amount of assets required to carry on a large housebuilding business.[3]

Three firms were found to have more than $5,000,000 in assets. These are the Goliaths in an industry whose history is one of Davids. Measured by assets, most of the large firms are in the brackets between $1,000,000 and $5,000,000. The median large firm had $1,080,000 in total assets. Net worth was $419,000 with the remaining $661,000 owed to others. More than half the total assets were current—representing units in construction and inventories of materials. Real estate or land held for development constituted the next largest item in total assets, and, as discussed above, represented one of the greatest problems. The median land holding of large firms was valued at $310,000. These firms also had substantial miscellaneous assets, with a median of $190,000, covering investments in affiliates, utility deposits for improvements which are repaid over several years, notes on previous sales, and similar items. Finally, the item of equipment remains extremely small, as we have seen, at $17,500 (fig. 2).

[3] See Appendix E.

The large firms turn over their capital an average of five times a year—the highest turnover of all the groups. Combined with the highest rate of profit on sales, this gives them the greatest return on net worth—an average of 30 per cent per annum (tables 31 and 35).

These averages tend to conceal almost as much as they reveal, because of the breadth of the gamut run by this group of firms in assets. Because the total assets range from $350,000 to more than $10,000,000, an examination of the firms ranked by asset size yields interesting results which may be more telling than averages (based on survey given in Appendix E).

The most striking fact is the high correlation between large asset size and age. The firms which have been in the business the longest have had the most time to accumulate assets and have done so. The ten richest firms average twenty-six years of age, whereas the ten least wealthy in this category of large firms average only eight years. The average assets of the top ten are almost seven times as large as those of the bottom ten. There is some correspondence between assets and number of completions. The wealthiest firms completed about 30 per cent more houses, on the average, than did those at the other extreme in this group. Their houses tended to be somewhat more expensive—built on costlier land, often within cities, thus requiring more formal structure—and they also developed more communities. This meant that their total dollar volume of sales was more than double that of the group with less assets. A few of the firms with the smallest assets, however, were among the highest in number of completions, thus injecting an inconsistency. In all respects the middle ten fell between the top ten and bottom ten—in assets, age, and number of completions. In comparison of firms within the group by assets and by volume of production, it is observed that assets increase more rapidly than volume. Put another way, the wealthy firms' assets per unit completed are larger. This calls attention to the immense variation in turnover of capital characterizing the firms at the extremes of the large group—a variation which extends to relative risks and profits. The formula for the variation appears to be: the smaller the capital, the greater the turnover, risk, and possible rate of profits.

To enter the category of large firms at all, many firms must accept the affliction of continuous anxiety about capital. These are, of course, the firms which come in at the bottom of the classification in terms of

total assets. They must utilize their capital as efficiently as possible, turn it over as fast as they can, and consider its status in all their decisions. This means that they are living on the edge of danger at all times, since if they miscalculate to any great extent or if sales are held up by a slow market, a materials shortage, or a labor delay, their income may not meet their necessary outlays.

The 10 firms in the group with the least assets turned their capital over 8 times during the year; 6 of these firms had a turnover ratio higher than 10 times a year. One of the factors making possible the rapid turnover was a far lower investment in land and real estate by these firms compared with the firms possessing the greatest assets. The bottom 10, in assets, had real estate holdings representing only 6 per cent of their annual volume, compared with 40 per cent for the top 10. This meant that the owners of the firms with the smaller assets had to act as promoters and had to bring in other persons who would share their risks by holding part of the land necessary to their operations.

These firms also had a higher rate of profits on sales. They averaged about 14 per cent profit per sales dollar compared with 5 per cent for the more highly capitalized firms.

This higher rate of profits on sales combined with their much more rapid rate of turnover of capital brought the average rate of profit on net worth for the low-capital firms to nearly 12 times that of high-capital firms in the group—170 per cent compared with 14.

The firms at the lower end of the group of large builders, by assets, have been expanding as rapidly as their capital can bear. The wealthier firms in the group, on the other hand, have slowed down their rate of expansion. They have the riches and resources which would potentially allow them to grow even larger, but they have not used them.

The relatively high profits of the whole group of large builders are explained primarily through the presence of the expanding firms. Instances of a five- or tenfold increase in the net worth of these firms during the first four postwar years are not uncommon, although these dramatic increases have usually been built on a comparatively small base ($25,000–$50,000). Whereas the total profits of the wealthier firms have been as large, the relative rate of profits has not been as spectacular because they have been based upon a much greater net worth. It should be pointed out, however, that these large postwar

equities need not, and in fact usually do not, represent large initial investments. They frequently result from large capital gains made in land or shopping center holdings. Their size is a result of reinvestment of profits rather than large initial investments.

When firms have a healthy equity and, as in the case of the most heavily capitalized firms, have reached a point of slower turnover, they find that their construction financing is somewhat simplified. The firms with large equities are sufficiently sound so that banks will grant them credit based on notes against their general assets. These advances can ease the strain of credit for land development and relieve similar operating difficulties which harass the smaller builders. They also cost the large firms much less than regular mortgage credit because of savings in title fees, taxes, and similar expenses. The large firms still, however, use the Federal Housing Administration commitment and construction advances almost exclusively when houses are actually in process of being built.

The largest builders occupied a highly favorable bargaining position in relation to lenders after the war because they could generate a large volume of loans which could be placed on the books inexpensively. Instead of requiring a separate negotiation with the bank, the Federal Housing Administration, and the Veterans Administration over commitments for each house, loans for the large builder could be handled in groups of 25 to 100 units with corresponding savings in time and effort. Any builder who could promise a quantity of mortgages was sought after, since lenders were actively pursuing outlets for funds. Furthermore, it was worth the large builder's time and effort to use his bargaining power to get the best financing deal, in view of his great volume. A difference of $100 a house in financing costs on 250 units amounted to $25,000.

For these reasons, the largest builders spent more time on financing problems than did the others. If they could not get satisfactory terms in the local market, it was worth while for them to travel to other areas, especially New York. Their volume was large enough to enable them to operate as mortgage brokers, if necessary. As happens in most situations of strong bargaining power, such steps were usually not necessary. Satisfactory accommodations were usually available in local banks, and in only a few cases during the period under study did large builders go outside the Bay area for funds for their permanent loans.

The large builder's problem was to obtain the necessary permanent loan at the best possible terms. The fact that the best terms were available only on government-insured or guaranteed loans limited his area of maneuver and reduced his loan campaign to two fronts: (1) to obtain the commitment of an institution to lend on insured or guaranteed loans; (2) to obtain the highest possible appraisal from the government.

In the first place, the commitment was crucial because the relation between the permanent and the construction loan was inseparable. The builder required a commitment for the permanent loan before he could obtain his construction money. The reason for this is the fact that the equity upon which the operative builder works is too small for him to keep much money tied up in houses upon which he has received a deposit while the prospective owner searches for financing. If he had to wait on such terms, there would be little or no large-scale building. Twice during the postwar period the large builder's operations were seriously affected by conditions in the permanent loan markets. The first occasion was in 1948, when the supply of 4 per cent money for Veterans Administration guaranteed loans dried up. The second was in the spring of 1951, when both 4 and 4.25 per cent money became extremely tight. The first money shortage mainly affected the rates for which builders could borrow their construction money and the terms for which they could sell their houses. The second affected their ability to build at all.

In the second place, the highest possible appraisal was important because if a builder planned to avail himself of terms made possible by the Veterans Administration guarantee, his selling price could not exceed their estimate of fair value. The Federal Housing Administration, though not fixing a maximum price, did set a maximum loan, thus affecting the amount of equity required by both the builder and the eventual purchaser. Hence the builder had to make certain that the design of the house was one which would obtain a maximum appraisal. He also had to spend time in negotiations if appraisals fell below his expectations. Failure to obtain a sufficient appraisal seriously limited the builder's ability to sell.

During the times of shortage, builders did more shopping for terms and funds. Since Veterans Administration and Federal Housing Administration terms are the same for each borrower, identical condi-

tions for final financing were offered during most of the period. Occasionally, however, certain institutions were willing to make 4 per cent loans though others insisted on 4½ per cent. Occasionally, some institutions allowed lower down payments than others. There were likely to be differences in the premiums charged or granted the builder. And there were some variations in service, such as the speed with which loans were handled and payments made.

Except during shortages, these differences were not sufficient to cause most builders to shop the market assiduously. The average builder was inclined to continue his customary relationship with his regular bank, unless some very strong incentive for change arose. Only those builders most conversant with financing took advantage of differences in the market. As the size of the builder grew and he became more familiar with how to flex his bargaining power, he began to deal more freely in a wider market.

Even so, the large builder was not always pleased with his changed financial situation, nor sure that it was advantageous. The large-scale operative builder deals in a financial market which is much more sensitive to governmental action than that of his contemporaries of lesser size and other types. His is the money market which has changed most rapidly and received the greatest attention. This is the sphere of financing which has made possible the growth of large builders. But its dependence on government support puts the large builder in an ambivalent situation. His livelihood depends upon government aid, but he fears its potential competition, and also the possibility that it may enforce regulations which will cause him difficulties.

The Market

Where? What? How many?

These questions, and usually in this order, characterize the large firm's approach to marketing.[4]

Since the large firms are all engaged in merchant building, their executives must determine at the outset the location, the type of houses to be built, and the number of units before a project can start. On the success or failure of their answers will depend the end result of all their efforts—the sales.

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[4] The description in the remainder of this chapter is based on the case studies and surveys described in Appendix D.

In the majority of cases, builders have concurred in the nature of their answers to these questions. Builders in the category of large-sized firms may be divided into two kinds of businessmen: the leaders, who search for innovations, hazard new techniques, test new materials, try organizational experiments, and, above all, who risk departures in design to improve their product; and the followers, who take the course of least resistance and imitate past performance. The majority of large builders have been followers and are thus largely to blame for the fact that housebuilders as a whole during the postwar period brought on themselves the accusations of fostering atrociously bad design and of building the slums of the future.

Firms acting as followers have had smooth sailing in the postwar market. They ran before a good breeze of spontaneous demand and were able, with the aid of government guarantees, to sell financial terms—the appeal that monthly payments amount to less than rent—rather than having to depend upon any ingenuity of their own to sell their product. With the need for shelter and the attractiveness of the financial situation (in which ownership appeared to cost less than tenancy) fanning the market, the product sold itself. The follower firms had only to observe the type and price range of houses selling rapidly, including their own previous years' production. They had only to find suitable land as close as possible to the earlier units. They had only to put a similar house in a similar area and count on a similar buyer to come and get it. It was that simple. This method of close copying is the classical case of a monopolistic competitor who wants to cut into another's market.

The follower firms paid little or no attention to the development of their product. They did not have to. They merely copied existing designs or stock plans. They spent minimal amounts on site-planning, on architectural variations, or even on such details as color differences. Public appetite for housing was so ravenous that it was not necessary to change the icing—much less the cake—to tempt consumers. Even the few flashy changes for advertising purposes, which are familiar in a competitive situation in most fields, did not take place in their housebuilding.

Since the firms which were only followers did not invent or devise or innovate, the pivots in their operations were primarily purchasing and production. Unless they made some large error in judgment in

purchasing land and locating their product, or some great miscalculation in production, they had units which automatically sold in a seller's market. Only a rapid shift in demand could have caused difficulties. The nearest thing to a market shift developed in 1949, when, before the easing of credit, demand slackened. Robbed of their ready-made breeze, some of these firms began to founder in marketing difficulties, but a new burst of demand put them back on their course. A few firms of this follower type did make location errors which retarded their sales. None, however, was serious to the point of submerging a builder, and the lowerings of value resulting from these mistakes were more than offset by rising prices and general boom conditions. In a more competitive situation, of course, either the shifts in demand or the mistakes in locations could have wrecked a housebuilding business.

In contrast to the majority that have just been described as followers, about a third of the large-sized builders did assume leadership in blazing new trails of product development and marketing. A listing of some of their innovations, to give an idea of their approach, includes: (1) developing a new area or town, (2) designing a new low-cost unit, (3) specializing in modern design, (4) using hitherto unused titles of government financing, (5) specializing in housing for minorities, (6) bidding on Wherry Act housing, (7) attempting a very high-cost exclusive development, (8) entering into areas where no large-scale builders were operating.

Each of these innovations involved a certain amount of risk. One of them—the high-cost exclusive development—turned out rather disastrously. Apparently buyers with sufficient income to afford high-cost housing did not, generally, choose to buy it in a tract. Another innovation for housebuilders—entering the FHA 608 field, apartment house building—looked, for a period, as though it might damage the reputation, if not the pocketbooks, of certain firms; but this situation may have been corrected by the defense inflation.

The method used by most innovators contemplating a departure from established pattern in site, size, type, or price was to attempt some sort of market analysis, even on an elementary level, and to begin experimental projects with only limited investment so as to keep risk as low as possible. The attempted market analysis was commonly of the back-of-an-envelope kind, or, more exceptionally, involved the

summoning of specialists for consultation. In either case, the object of the market analysis was to estimate the number of families within certain income brackets who might desire to live in a given area or who might be in the market for a particular type of home. If the back of the envelope, or the consultant, convinced the builder he had found a new market, he tested it. When adequate financing existed or could be found by persuading the lenders, including Federal Housing Administration or Veterans Administration, that the idea was sound, the firm could proceed. The next steps would ordinarily consist of buying a minimum of land outright and the rest on options, building a model house or houses, and starting construction on 25 or 50 units more. If these sold well, operations would be expanded as rapidly as possible.

The physical planning of new projects was handled partly by the firm and partly by its consultants, working on a fee basis. The firm often roughed out its own ideas as to the site development and house design. Then it would call in an architect or engineering firm to check its plans and offer criticism and advice. Houses are usually designed to a price. The frame of price might require paring certain features off the original design, or in rare cases adding features. If costs changed, an effort was usually directed toward offsetting increases by altering the design rather than by raising the price.

Architectural assistance was usually paid for on a straight fee basis. There were a few exceptions at either extreme. Some firms had complete architectural and planning staffs, and some took the opposite course and hired outside architects to assume responsibility for the whole job. Whatever the arrangement, the use of architectural service was generally held to a minimum by builders, who held the view that architects are not interested in the mass market, are not sympathetic with what the builder is trying to do, and do not know enough about housebuilding anyway to hold costs down. Here is one area where a popular theory—that of lack of coöperation between builder and architect because of dissimilar aims and language—is borne out in professional practice.

The one-third of the large builders who were progressive in their attitude toward experimentation and product development kept abreast of material and design innovations by reading the trade journals and technical press and by attending association meetings. Successful ideas can and have spread rapidly after having been proved

economical and salable. The challenge to the industry is to find the first few who will risk a new idea.

The fact that some innovators have existed, have been willing to try out new ideas, and have spent larger sums on design, has meant a gradual improvement in the product. Most critics believe that Bay area builders have generally been more dynamic and inventive and have done a far better job in improving their product than house-builders as a whole. Unhampered by the architectural strait jacket of "the Cape Cod house," local builders were able to start with a freer prototype for the Bay area house. Their site design, too, has been more creative, forced into new patterns by more difficult land problems. The same critics who admire these features state, however, that the ease of selling the houses has removed incentive for further improvements which would have been both desirable and possible.

This lack of incentive produced by a seller's market was also responsible for the general inattention to marketing problems. Little was done in the field of marketing because little had to be done. Large firms usually handled their own sales directly or through a land-development affiliate. Sales effort consisted almost entirely of the insertion of a small display advertisement in the Sunday newspapers when the model home was completed, and the presence of salesmen or clerks equipped to accept down payments when customers appeared.

This system made for very low selling costs with consequently high efficiency, relatively speaking. It did not increase a firm's ability to sell in other than a seller's market. Neither did it lead to any increased understanding by builders of what buyers want. With the exception of the guesswork engaged in by some of the innovators, virtually no efforts were made in the direction of market analysis.

Production

It is in the production process that some of the most conspicuous differences between the small- and the large-sized builder may be seen. The source of these differences is size: with increased scale, builders can specialize the functions of their labor. The larger size of operations does not merely permit the employment of more efficient methods of production—it forces them. In the sphere of labor utilization, the big builder is forced to adopt mass-production industrial methods to compensate for the lack of highly developed individual skills among

his workmen. The large firm does not have access to the skilled craftsmen who are available to the small builder. The small builders and often the medium-sized firms can hold on to their most able and satisfactory mechanics; the large firms, which employ between 100 and 200 workmen, cannot. Although the large firms would like to keep all their men from project to project, such continuity of employment is seldom possible. The best they can do is to retain their key men by slowing up the work at particular times, using their foremen and crew leaders as regular carpenters and maintenance men, assigning them to small jobs, or even giving them paid vacations if necessary.

In keeping their key men, they maintain the best of the know-how and systemization of their labor force, but when they must build up crews for a full-scale project, they have to draw in new men. Men who are immediately available in the labor market are ordinarily those who have not been considered sufficiently valuable to be held in steady jobs. In addition, when a firm is expanding rapidly, it may have to bring into the labor force workers who have had no previous housebuilding experience. The actual skills thus available are not of the highest level, and the individuals are not likely to be versatile. If these men were required to perform all types of carpentry, as do carpenters on the smaller jobs, their efficiency would be extremely low. To keep their labor costs down and still obtain sufficient labor as needed, the large firms must resort to a breakdown of tasks. In effect, they "de-skill" jobs. For example, they have carpenters use only one tool or do a single type of operation instead of the great variety of tasks expected of a trained carpenter. A man can be trained in a short period to do one thing well. This, of course, is familiar industrial practice. It may be recalled that the rate at which pattern- and tool-and-die-makers were turned out during the war astonished everyone. These men did not have the high level of skill previously required in the trade; usually they learned to do just one thing. This is now true of many carpenters doing a satisfactory job on tract work.

This increase in specialization does more than merely make up for lack of previous skill, experience, or versatility. It is actually more efficient. After the first two or three months of training crews and setting work standards on a tract, the labor cost falls to such an extent that the large firms save about 26 per cent compared with the wages expended by a small firm building a similar house (table 50).

How is this increased specialization accomplished and how does it work for greater efficiency?

The first step in accomplishing it is the organization of the work force into small crews, each of which handles only a single task. The factors which influence the decisions as to the number and content of these crews, with maximum efficiency in view, are diverse. They are psychological as well as organizational.

Psychologically, though a man acquires skill and speed by repetition of a task, his output falls if the job becomes too boring and routine.

Organizationally, time losses from waste motion, misused skills, and poor job coördination must be guarded against. In terms of motion, either the mechanic must move from one house to another, or a method must be devised for delivering his completed work, performed at one site, to the various houses. If each job per house is too small, his waste motion will mean serious time loss. In terms of use of skills there must be a proper relationship between supervisors, skilled, and unskilled men, since each receives a different wage rate. It is desirable to use as much unskilled labor and the least supervision possible. This standard suggests using fairly small crews under working foremen who perform supervision as an added duty. An unskilled laborer's time may be shared among the crews, thus keeping the crew's time confined to specialized work. In terms of job coördination, each crew must hold its pace and yet be kept busy at all times; it should not finish a job too soon or too late. Even very small waiting periods cumulate to large wastes. Tasks must be planned in relation to each other, and add up to a complete day's work. Jobs must be organized to allow leeway for normal errors, inspections, and inspection delays without wasting time or capital in needless slack.

These considerations lead to an increase in the number of crews and in the amount of specialization as the size of a project grows. Medium-sized tracts may use from three to five crews having no specialization within each crew, but when a tract is large there must be as many as ten crews with some job specialization within each one. As an example of intracrew specialization, in the finish crew one man may hang doors, one windows, one do the trim, and so on. The number of crews performing each task can be varied. It is possible that some rather rapid jobs, like sawing, can be performed by one crew on all houses, whereas the next task—framing—may be performed by four crews each working on a separate house.

A builder with about the maximum number of crews has one each for sawing or cutting; for foundation forms and mudsills; for subfloors; for layout and raising; for rafters and roofs; for roof sheathing; for exterior trim, door jambs, and casings; one for clean-up and one for finish. The size of the crews varies from two to five men. Each has a working foreman who reports directly to the site superintendent. If several crews are used for the same task at the same time, as in framing, there may be a foreman over each group of crews.

Jobs are planned on a large project so that no two crews work on the same building at the same time. A waiting period ranging from half a day to a day between tasks allows sufficient slack to iron out minor irregularities. This kind of organization requires especially careful scheduling to insure the proper work coördination among the various crews.

In theory, it might seem simple to set up and schedule crews; in practice, this is one of the most difficult jobs in the entire planning process. It is a job which points up the great differences between firms and has an important influence on the entire efficiency of the building industry.

Part of its difficulty arises from industry adjustment to a new situation, with lack of precedent for it. As a firm expands, the shift to crew work and more detailed scheduling requires skills and information different from those employed in the past. When the firm's operations were small, slight attention was paid to losses resulting from a break in the job rhythm or from waste handling and lost motion. Since no exact standards existed, the general basis for supervision was determined by visual inspection of how hard a man was working, rather than how efficiently. The new situation produced by large volume operations demands new standards of supervision.

In acquiring more size, a large firm's specialization of labor functions is only half of the change in its production picture; mechanization is the other half. Like the organization of the work force into specialized crews and the coördination of the crews, mechanization requires careful planning and involves many decisions. The decision as to the type and quantity of machinery to be used on any job depends on such factors as the number of times an operation is performed, the decrease in labor time achieved by the machine, the initial cost of the equipment and its upkeep, and the experience and planning ability of the supervisory staff.

The first mechanization question concerns the foundation. For the individual house constructed by the small builder, the foundation trenches and the trench for the main soil line of the house are almost always dug manually. Machines are not very effective because the tolerances are small; the effects of boulders, roots, mud, and the like are pronounced; the cost of the machine, even if rented, would be large compared with the total trenching cost ($30–$50) on a single house; and moreover, the work is usually done by a common laborer who might otherwise be idle. In a medium-sized operation, the possibilities for mechanization are greater. More units are worked on in a given period, and thus the machine overhead is spread further. It is not so important to find a job for a common laborer because the ratio of unskilled labor to skilled workers is decreased, leaving those on the payroll with less free time. Consequently, a simple machine, usually a pneumatic jackhammer, is used effectively to break and prepare the soil for lifting. Actual lifting of the soil is still done by hand. Finally, in some of the most efficient large tract operations, when the amount of work is sufficient to offset the costs of time lost in transportation of equipment, the trenching may be done by small mechanical trenchers using revolving wheels and buckets which both dig and throw out the soil—a much speedier process than hand trenching.

The next mechanization question on the builder's production schedule concerns the machinery for transportation and materials handling. When houses are built individually or lumber is transported directly from the lumber yard, machinery is limited. For the medium-sized builder with yard and warehousing facilities, transportation may be handled by the high-leg lumber carriers—"Hysters"—which simplify the loading problem by picking up and carrying a load suspended. Skids and trailers may also be used, since they can be loaded or unloaded easily and may be left at the house site until discharged. As the size of a firm's operations increases, materials-handling equipment—fork lift trucks, similar units equipped with a shovel or loader, fixed roller conveyors and tractors—may also be added for use both at the site and in the yard. All yard operations use some of this equipment, and many of the largest and the most efficient of housebuilders' operations use all of it.

The next opportunity for mechanization occurs in the rough carpentry phase of production. Here is found the maximum use of

machinery and its maximum variety. All operations, regardless of size, use a certain amount of power equipment. Although many builders, especially the small ones, still depend largely on hand equipment, in certain projects every part of the process except hammering is mechanized. Even hammering is partly mechanized by some large firms which use pneumatic hammers for nailing the subfloor.

In every house, the number of cutting operations bulks so large that it is obviously worth while to mechanize them, especially given the comparatively low overhead and maintenance costs of a single power handsaw. Almost all projects, including the single houses produced by the small builder, provide for the power sawing of studs, subflooring, and sheathing.

Variations begin to occur when scale of operation makes it necessary to decide to what extent power should be employed on cutting lumber for small items such as fire-blocking and bridging, or for such pieces as headers and cripples, as well as for the cutting of special notches and forms. The number of each of these cuts in a house may be so small or an operation may be so limited that special planning for mechanization hardly seems worth while. Most of these jobs on the individual house are performed by hand. Even in the medium-sized tract, such operations as cutting off stakes for forms, cutting occasional boards, and the like are done by hand. In larger units, however, this kind of process is simplified either through design to insure a minimum number of odd-shaped pieces or by cutting similar units for many houses at one time, though each appears only once or twice per house.

The final phase of the builder's direct operations concerns the finish carpentry. In a tract operation, in contrast with scattered houses, doors and windows are ordinarily hung with the aid of power equipment including small power saws, a power router and drill, a power plane, and templates. The complete process of cutting, planing, routing, and drilling is performed by machine.

The use of machinery on trim and baseboards is uncommon. The pieces have to fit exactly and cover any small variations which occur in placing the studs and so on. These pieces, being small and thin, can be cut nearly as fast by hand as with machinery.

Although the builder's use of mechanization on most of his direct operations increases with his increase in scale, with consequently heightened repetition and specialization of tasks, the methods of the

subcontractors do not change much in relation to the size of the tract because the subcontractor is already a specialist doing repetitive tasks. There are a few exceptions. For example, the use of machines to tape wallboard is just becoming popular on tract work. Aside from the fact that the mechanism is somewhat cumbersome, there is no apparent reason why it should not be used in individual houses. In a similar manner, an electric sander is sometimes used for sanding down the taped joint.

Another exception is the extent to which machinery is used in plumbing. This also varies with the size of the project. On some individual jobs, pipe is still cut by hand. On others, a portable pipe cutter is attached to and powered by a truck. On tracts, however, it is customary to install heavier pipe-cutting machinery either in a temporary shop in the yard or in the main shop. Certain standard lengths and joints can thus be fabricated repetitively.

Whatever the size of the project, digging for main sewer, water, and gas lines is always done by machine, usually on subcontract to a firm specializing in this work, of which there is a large amount.

Except in unusual cases, excavating and grading are power operations on all projects. For this work, tractors have either a scraper or loader blade, and the excess material is removed with dump trucks. On larger-scale operations there is the advantage of working on several sites at once, with spread of the overhead and setup time over more units, and the possibility of saving on hauling and backhauling when excess material from one unit can be utilized by an adjacent one.

The pouring of concrete and the finishing of flatwork use a great deal of mechanized equipment. Almost all concrete for jobs of all sizes is delivered ready-mixed in the now familiar transit mix truck. The finishing of flatwork requires some hand labor, but this operation, too, is in the process of mechanization. If the amount of tamping is large, it is frequently done with a pneumatic tamper. On the larger tracts finishing is speeded up with a combination of power and hand trowels.

Another type of equipment comparable to machinery is special scaffolding and similar gear designed to save labor effort in larger tracts. Since crews follow each other rapidly, the equipment can remain in place to serve several purposes.

Contrary to popular assumptions, it is apparent that the use of machinery in housebuilding is following a path of dynamic progress

and that hand power is far less important than is supposed. Part of the increased popularity of mechanization is due to new inventions and the simplification of equipment to permit its use on individual houses; part arises from the ability to distribute its cost over more units when projects are larger.

Purchasing

The most important progress toward increased economy resulting from increase in scale of operation has taken place in the field of purchasing. Here the large builders have devised new methods of materials distribution and developed new relationships with subcontractors. These changes have led to impressive cost reductions. The big builder needs and gets far less service. In addition, he can absorb items of lower quality than can be furnished to the builder of individual houses. Simplification in the distribution and trade contracting system, as well as economies, have contributed to heightened efficiency (table 23).

The new distribution system is primarily based upon direct purchase and direct delivery from the mill. Orders are placed at the mill itself, or are placed through a broker or a wholesaler, with shipments straight from the mill to the builder. One-quarter of the large firms have established building-supply affiliates in whose names goods are purchased. About a quarter of the firms—with some overlap between the two groups—go beyond this and actually own or control the mills from which they draw their supplies. These innovations eliminate one or more of the traditional distribution channels.

At the same time, a standardization has taken place. Special brokers who handle only items for tract houses have come into being. Their tract-house items are frequently standard goods which have been redesigned to give minimum quality at a minimum cost. The broker or wholesaler specializing in materials for tract work builds up a large volume in a few selected commodities and thereby lowers his margins. The conventional or traditional wholesalers state that they cannot compete with these specialty jobbers because the type of service rendered and the kind of goods offered by the specialists are too dissimilar from the service and goods used by the traditional trade.

For example, large builders have found that they can strike a better bargain by purchasing steel kitchens in carload lots rather than buying

the traditional plywood cabinets, which must then be painted and covered with tile or similar materials. The carload price on such items as standardized steel kitchens may run 20 per cent or more below normal wholesale prices. The savings effected by purchase in carload lots combined with elimination of additional treatment such as tiling and painting represent an important economy, much more than offsetting the cost difference between metal and wood.

To obtain the substantial savings on materials by buying in carload lots (or for a few specialty items, in standard packages) often involves buying for as many as 40 or 50 houses at once. This presents the builder with the problem of storage and warehousing, but storage is done on the tract and the complications created are few. The increased expense incurred by storage is insignificant compared with the possible savings inherent in quantity purchases. Compared with the small builder, the average large builder saves $410 on materials purchased for a typical house, and the largest builder may save an additional $130, or a total of almost a quarter of the small builder's materials cost (table 51 and Appendix H).

The progress in relationship between the large builder and his subcontractors follows the lines already begun by the medium-sized builder. New developments stress a growth in subcontractors' specialization and controls parallel to the growth in the builders' own production processes. In addition, the large builder-subcontractor relationship is likely to be closer, sometimes exclusive.

To a great extent, the reduction in charges of the subcontractor to the big builder—equivalent to increase in efficiency—stems from the same four factors in larger-scale operation which are responsible for the subcontractor's reduction in charges to the medium-sized builder. These are (1) more efficient use of labor; (2) savings on materials purchases; (3) better controls; (4) lowering of overhead and profit. Since these factors are progressively more important as sources of savings when scale of operation grows, they result in even lower prices to the large builder than to the medium-sized firm.

A fifth factor enters the situation for the large builder. This is better management arising from increased size. The large builder who, himself, has reached the level where better management is possible, is likely to have trade contractors who also operate more efficiently, either because the builder is dealing with a large trade contractor who

needs and can afford better management, or because the builder aids in his subcontractor's operations in order to protect himself.

Contrary to a popularly held belief that the big builder takes over a greater and greater share of the production process as his scale of operations expands, there has been only a slight tendency for large builders to assume directly, through crews of their own hiring, production jobs which are traditionally handled by subcontractors. Half the large housebuilding firms in the Bay area did not handle directly any processes which are typically subcontracted during the period studied. Most of the remaining half had their own crews perform only one or two of the 12 to 15 possibilities ordinarily subbed out. None of these firms made it a matter of policy to attempt to integrate as many processes as possible (table 22).

What are the factors which determine whether or not integration is worth a builder's efforts? In theory, integration appears attractive. Most large firms indicate that they have tried integrating various processes at one time or another, and on occasion have even been forced to do so by the dearth of good subcontractors. But they have usually returned to the minimum list of functions directly performed and subcontracted out the rest. This is significant in showing that the existing situation is not due to inertia but is a policy pursued after testing of other possibilities.

Even counting the cases of integration of a few functions, it was found that the total number of subcontracts entered into by the typical large firm is often actually above average. As scale increases, some tendency exists toward further specialization and breaking off of additional functions. For example, the forming of foundations, hanging of cabinets, installation of window sashes and garage doors, landscaping, window cleaning, and clean-up are likely to be done on subcontract for large firms, whereas they are almost always handled by the builder's own crew in small units. Such proliferation of subcontracts increases the total for large firms, even when some of the subcontracts on the initial list are eliminated through integration of the processes by the builder's own crews.

An exception to this tendency toward breaking off of additional functions and proliferation of subcontracts occurs among some of the larger firms which practice a form of quasi-integration. Certain big builders prefer to deal with subcontractors who expend most of their

effort on the builder's tract alone, and retain only sufficient reserve business to hold together their crews during slack periods on the big job. These builders feel that such arrangements enable them to insure better coördination and at the same time to make a better bargain. To promote this type of relationship, the builder may aid a mechanic to establish himself as a trade contractor, or he may help small trade contractors to expand their size, furnishing, if necessary, financial or managerial assistance. Frequently there are no direct formal agreements, financial or otherwise, but prices charged by the trade contractor will be low. Sometime trade contractors established in this manner branch out until eventually they may have no commitments with the builder who gave them their original chance at expansion.

In many of the trades, a single contract to handle a large builder's annual business will put the subcontractor into the large or medium class. This fact has stimulated many subcontractors to spend more time on perfecting production techniques for fulfilling large contracts. Several trade contractors specialize in tract work and are able to insure a large volume of business for themselves by obtaining the contracts for several tracts.

When the large builder prefers to work with a smaller contractor willing to concentrate exclusively on his own tract, it pays the builder to furnish planning assistance. The advantage here is that while he is planning his own production, he can, at the same time, plan that of his dependent trade contractors. Since any failure of the subcontractor to keep up to schedule is a threat to the builder's own progress, the builder can investigate difficulties directly and help solve problems.

As a result of the savings which have been discussed, the trade contractors working in tracts tend to be the most efficient. It is also true that variations in efficiency exist among the trade contractors on tracts just as they do among large builders themselves. The best methods, though available, are not used by all of them. Some trade contractors are more efficient than the builders for whom they work, and vice versa.

Controls

It is in the control of the building process that the largest firms differ most from the small- and medium-sized firms and also from the less large firms within the category of large-sized builders.[5] About 25 per

[5] This section is based on the case studies and surveys desdribed in Appendix D.

cent of the big builders use a fairly complex and detailed system of production controls which, they believe, aids them in increasing efficiency and lowering costs. Another 25 per cent of the large-sized firms employ a quasi-control method, but it actually has little influence over their construction processes. The remaining half of the large builders resemble most of the medium-sized and small firms by using only the most rudimentary system or dispensing with any system at all.

What functions can a control system perform? The six major ones are: (1) keeping track of the value of the firm and of its profits or losses through accounting; (2) keeping track of all physical property by an inventory subsidiary to the general bookkeeping; (3) budgeting to enable the firm to estimate money requirements; (4) programming work so that purchases are made at the proper time, and labor and trade contractors arrive at the site when required; (5) determining the true costs of all the components, sections, and separate features of the house through cost accounting; (6) scheduling work to insure performance of tasks in the proper manner, order, and with the best techniques and equipment, and thus increase the efficiency of labor.

The first four functions of control are found, in simple form, in all large firms. But most firms make little or no effort to integrate these fragmentary functions into a whole control system, coördinating every aspect of the building process. Most builders believe they have a control system when they set up a general estimate and time schedule. Actually, they do not have a complete and workable control system at all. Lacking any real control of production, they lack knowledge of how to improve their efficiency.

The activities which make up any system of production control are routing, scheduling, dispatching, and reporting. Routing is a planning step which consists of mapping the course of the product through the production process—deciding what operations will be performed, how they will be performed, and in what order. Scheduling is also a planning step and provides the timetable of operations—it is the selecting of the times for performance. Dispatching is the issuing of orders, authorizations, and instructions to production centers at the times specified in the scheduling. Reporting is the reciprocal function of transmitting production information from the production centers to those who route, schedule, and dispatch.

These activities may be carried out in a simple, informal manner without the aid of specialists or detailed record-keeping systems. The

complications introduced into most industrial production-control systems arise from the necessity of closely controlling varied and complex production processes which require a large volume of information to be handled rapidly and accurately. This necessity is not present in housebuilding. When the production process is simple, as in housebuilding, the volume and frequency of the clerical tasks of control can be correspondingly simple.

The advantages of production control to management are obvious. A serviceable system can facilitate intelligent establishment of operating requirements and proper utilization of productive facilities, can simplify order giving, and can quickly make known any deviation from established output standards. Still more importantly, it can promote efficiency by compelling more intensive consideration of the technical organization of production. Procedures which have been matters of custom or which have been left unspecified, and hence have been improvised in the process of direct supervision, are likely to be scrutinized more carefully in terms of their necessity, the time required for their performance, their method, and their relation to other parts of the process. This is particularly true when the system includes accurate cost data.

Production scheduling and setting of output standards usually require a detailed study of jobs and groups of jobs to eliminate superfluous tasks, reduce idle time, secure the advantages of repetitive processes, and gain the best balance among operations. Production control for the housebuilder necessitates an examination of methods and consequent decisions as to the best technological processes. Such analysis of procedures and processes benefits management by weeding out waste.

Large firms, as well as the medium-sized and small firms, which do not give much attention to the planning and control process must operate in a dappled light or in the dark. Without a production control system, they cannot be certain that the plans which they devise will work. A large part of their planning is guessing. At the end of a project, they can check their results back with their guesses, but it is too late then to correct any mistakes made on that project. They have to chalk up what they have learned to experience and hope that they may apply it better to the next project. To paraphrase the old barnstorming pilots, these firms build by the seat of their pants.

The top quarter of the large-sized firms, which have adopted highly organized production control systems, find that their systems keep them in the light as to what they are doing throughout the entire course of their operations. Their systemization enables them to plan wisely at the outset as to methods, costs, coördination of crews, scheduling of subcontracts, placing of orders for materials, and receipt of supplies. It permits them to know at every stage of the production process how much work has been accomplished, how much money has been spent, how much money has been received, what materials have been delivered, and what supplies are due. It makes possible a daily check of performance against plan. It gives the firm an opportunity to correct deviations from schedule as they occur. It assures the firm of results corresponding to expectations.

A comparison of the three-quarters of large firms which use only fragmentary control methods with those firms which employ a full-scale production control system shows that these advantages are principally generated by more accurate and more complete estimating and scheduling, based on better cost accounting records.

In the average large firm ordinary accounting records are hardly usable in operations and production. Although the accounting records of a firm grow in volume as the firm's production grows in volume, these records may be even less applicable for management decisions than are the accounting records in smaller firms. The volume of business and the complexity of the corporate structure require more bookkeeping for large firms, but the accounts contain merely historical costs for large groups of houses because they are maintained on a tract basis rather than on a house or group-of-houses basis. They are not detailed enough to be very valuable for management's future planning.

It requires an outright decision to change and great effort for the firm to develop its accounts to a point where they are helpful for cost analysis purposes. The firm must delve deeper than the payroll and similar financial records and develop special data. It is not sufficient to know what costs have been in general. Exact costs must be obtained for each specific operation, for each segment of the finished house.

A usable system of cost analysis in production control starts with accurate estimates for each part of production. This requires breaking down the construction process into a series of fundamental steps which correspond generally to the distinct operations found in standard esti-

mating manuals—trenching, installation of joists, hanging of windows, and the like.

The total carpenter hours and total laborer hours required for each step are estimated initially on past experience, for which complete cost records have been kept. When a new design is produced, extra care is taken with supervision and timekeeping during the early weeks to record the amount of labor actually utilized for each task. The number of men in each crew and the amount of work they are expected to complete are revised, as work proceeds, in accordance with the recorded results. Estimates and revisions are not creatures of formal time-and-motion studies but are the products of actual performance under strict supervision and "pushing" by the foremen. The estimate is tied directly into a scheduling and reporting system. From the completed estimate a weekly time schedule or operations-planning sheet is prepared together with a cost budget. The schedule separates the process of construction into logically sequential or self-contained steps, in the same fashion as was done for estimating purposes. The schedule is translated into a Gantt-type bar chart of man-days and materials quantities or some similar chart on which progress can be recorded.

In typical cases, progress is posted to the chart either daily or weekly. The posting to the production control chart is usually done from timecards, prepared by the foreman on the site, and from materials invoices, or it may be handled by special assistants who do only production control work. Timecards and invoices carry code numbers equivalent to the operations listed on the time schedule. This coding system is used both in accounting for labor and materials and for cost-control purposes. The schedule readily provides the needed job-progress information.

The posted chart enables the work supervisors to check anticipated against actual performance. If the men are kept off the job for some reason such as weather, this shows up in both anticipated and actual production and cost columns. If costs are running higher than budgeted, the line in the chart showing actual costs outruns anticipated costs. If work is slower than scheduled, a line shows actual production running short of planned production. These lines notify the firm that it must take action to restore efficiency in terms of lowering costs or improving the rate of production or both. If performance is shown by the chart to be surpassing work standards which have been set, super-

visory action may be taken to determine whether this is merely the result of some exceptionally felicitous circumstances, or whether work standards should be reëxamined as to their correctness.

In addition to job-progress information, the schedule indicates materials-purchase and delivery dates, and dates at which the various subcontractors should begin and finish their jobs. The estimate sheet, previously discussed, becomes the basis for the materials-purchase program, and orders are placed to cover an entire project with delivery as needed.

Any discrepancy between planned progress and achieved progress in any aspect of the operation becomes apparent on such charts and calls for expediting action by the site superintendent, office force, or top executive. Tighter control is possible with more frequent posting and with perhaps a finer breakdown of operations, but even the most progressive firms consider systems such as that just described to be adequate and the expense of a more detailed job-progress reporting system to be unnecessary.

In contrast with such a system, the estimates in the majority of firms are rough, although developed with the design. Their previous data are not accurate enough for fine cost analysis. Although materials and subcontract prices may be made definite before starting, direct labor costs and overhead charges are estimated on assumptions from past experience. Estimates are in terms of probable costs per house and for the project as a whole. Schedules are not precise but are of the one-house-a-day type. The combination of these inexact estimates and schedules gives a projected budget which magnifies all the inaccuracies in its sources.

These firms are handicapped by their lack of knowledge throughout their operations, from design and planning to price. Their dearth of information ultimately lowers their return on investment and weakens their capital position.

Almost every firm must pay special attention to its working capital position. A firm is in constant danger of becoming illiquid if there is any pile-up of inventory, whether this consists of unused materials, unsold houses, or work in progress. Money has a very high marginal value in the housebuilding industry, since the average firm ordinarily has large areas of possible investment which it is not exploiting, such as speculative land, materials, apartments, and so on. Yet these firms

are not able to budget properly or to make the most efficient use of their capital when emergencies arise. They may have to maintain an oversupply of materials, for example, to guard against materials shortages; they may have to engage in an overdrastic retarding action, when delays occur; they can never be certain their budgets will work.

Implementing the budget is a firm's time schedule. This, too, suffers—and, in turn, makes trouble—when a builder's knowledge of his own operation is inadequate. The schedule must include planning, financing, and preparation of land as well as the actual construction of the house. The ideal time schedule is organized to speed up the turnover of money and at the same time to allow slack for unforeseeable delays. High costs can result from delays for which no slack has been provided in the schedule—delays associated with slow materials deliveries, subcontracting problems, labor difficulties, and the like. The most highly organized time schedule strikes a flexible medium between tautness for turnover and slack for emergencies. This may require overtime in certain critical areas or a retarding action in others.

When the firm's schedules are not precise they cannot accomplish their purposes effectively. For example, purchase orders may be incorrectly geared to production if not closely regulated by schedules. When firms buy from retailers, purchases may be made only a day or two before use. When materials come direct from mills, the length of time between order and delivery increases. Variations in this length of time occur especially when the mill is on some sort of allocation basis. The perfected schedule helps not only with appropriate timing for placement of orders but also with follow-up dates on slow orders. The rough schedule may not allow for unusual lag in deliveries; thus the firm may have to stockpile unnecessarily in advance to provide for possible excessive lags, or it may be forced to buy materials more expensively on an emergency basis when something is needed in a hurry to keep production going.

Firms with a relatively casual schedule attempt to have their subcontractors at the right place at the right time and to be ready for them when they arrive, but they are not in the best position to inform their subcontractors well in advance of the definite dates when the subs are expected, or of the rate of progress expected of them. A firm can do this only if it knows, itself, the exact progress on the project at each

point. Since delays are costly to subcontractors as well as to builders, and since subcontractors, too, must plan labor and purchases, a subcontractor is likely to make a better price and do a better job for a builder on whose schedule he can depend.

All these factors lead to more efficient production in those firms with the best cost analysis and control systems. The amount of attention given to the planning and control of the building process seems to increase with the progressiveness of the management and the size of the enterprise. Association of lower costs with more detailed planning and tighter control gives evidence of not being accidental. Although statistics to support this view are not completely available, our impressions and management opinion agree that if the large-sized firms were segregated according to those with low and those with high production costs, more of the firms relying on planned controls would be found in the low-cost division.

Determination of Size of Firm

The year 1950 is a revealing period in which to study the determinants of size of housebuilding firms. In 1950, although concentration of production among the large firms increased, expansion was primarily among firms which became large for the first time. On the average, the firms which were already large in 1949 did not increase their share of production; many of these remained constant in size, though the total output of the area was expanding. Even those among the already large firms whose production increased still stayed within the same general size range. The maximum size remained below three starts a day, or 700 completions for the year. In the Bay area, no firms reached the 3,000 to 4,000 units-per-year mark which a few firms in other areas have done.

It may seem strange that these large firms in the Bay area did not further increase their size in a boom market. To understand why housebuilding does not follow the familiar trend of industry toward greater and greater concentration into fewer and fewer hands, it is necessary to think in terms of the trend of costs of firms in this industry.

Apparently, no great change in costs is probable with further increase in size within the ranges of possibility immediately available to local firms. These firms have reached a point where with additional volume they simply duplicate production methods and where added

advantages in spreading of overhead, purchasing, financing, and so on are slight. Firms would make about the same amount of profit per unit on each additional house sold.

At the same time, further expansion is troublesome. It increases their local competition. It requires more executive time. It is more risky for their capital situation. Because of taxes, it does not offer greatly increased personal income (table 21).

A factor in deterring large firms from becoming yet larger seems to be that the executive and managerial functions in this industry are still very personal. The average firm has from one to four principals, with an average of two. These principals own the existing organization completely. They make all the primary decisions and many of the detailed ones. If the firm is to expand much beyond present size, it must increase its top-level executive staff. In view of the personal nature of management in this industry, this can be done, ordinarily, only by taking in additional principals. Adding principals means dilution of control and of returns. The increase in returns, by the addition of one person, would probably not be sufficient to offset splitting them more ways.

It seems to be the concensus of the men who have built their hundred houses or more a year that unless some personal force is driving toward increased size, expansion is unnecessary. If expansion is stopped, then the capital position improves and the risk of a total loss diminishes. There may be, in addition, advantages in investing available capital in other related activities, such as property ownership, which may show a larger net return after taxes. For these reasons, the large firm tends to expand into related fields rather than further increasing the size of its own building operations. All these factors at work account for the failure of the existing large firms to grow much greater in volume even while the industry was expanding rapidly, and account, therefore, for the high number of large firms in the industry (table 21).

Summary

The postwar market, based on the need for housing and the money to get it, produced the big builder. He was the answer to the mass market's demand for mass production. There were 30 housebuilding firms in the Bay area which were able to build a hundred houses or more a

year to satisfy the hunger for housing. They represented only 2 per cent of the Bay area builders, but they built 6,195 houses in 1949 or 35 per cent of the industry's output. With average assets of more than $1,000,000, each produced a total dollar volume of business that year ranging from $1,000,000 to $5,000,000 and sold Bay area homeseekers their cheapest house—at an average price of $9,250.

It may not have been much of a house, measured by some standards, since it was located on newly developed tract land and was meager in quality and detail; some critics thought it had atrocious design. But the builders did not have to worry about design and quality; it was a seller's market and the buyer took what he got. The product sold itself and the firms concentrated on aspects of business other than design, market analysis, or merchandising.

They concentrated, for example, on operating structure, increasing their business entities to three, to help solve problems of risk, taxes, supplies, and labor. They developed additional functions such as warehousing and production control which increased their total overhead costs but made more than equivalent savings in direct costs. They spent more time on money matters, since, on the average, they owed $660,000 to others, and had to guard their capital position. By turning over their capital an average of five times a year and obtaining the highest rate of profit on sales, they received an average 30 per cent return on net worth. The firms with the lowest net worth turned over their capital fastest, made the greatest profits, and did the most expanding.

In financing, all large firms were preoccupied with the necessity of obtaining permanent loans before they could obtain construction advances, and with negotiations for highest possible Veterans Administration and Federal Housing Administration appraisals. Because they generated a great number of mortgages, the largest firms were in a favorable bargaining position in 1949, in a narrow money market sensitive to government action.

In production, they specialized the functions of their labor force, increased their use of mechanization, took advantage of more precutting and preassembling, more laborsaving devices such as patterns and templates. These innovations increased their efficiency, saving 26 per cent in labor costs compared with those of the small builder.

In purchasing, they saved 18 per cent on supplies compared with

the small builder, by inaugurating a new distribution system based on direct buying of materials; and saved 21 per cent in subcontracting costs by developing new and more efficient subcontractual relationships. A few firms adopted production control systems which appeared to aid in increasing efficiency and lowering costs.

Through taking advantage of the economies inherent in their greater scale of operations, the large firms averaged 10 per cent profit on sales. The largest firms seemed satisfied with that. Observing that yet further expansion in housebuilding only increased effort, strain, and risk without appreciably increasing net return after taxes, the largest firms showed a tendency to stabilize their capital in housebuilding and to expand in related fields.

6

Supply of Factors

Only part of the building process is determined by the housebuilder's own organization. A significant part of it is shaped by his factors of supply—factors such as materials, labor, subcontractors, financing, and land. The housebuilder's freedom of choice is limited by the availability of production factors he can purchase and the prices he must pay for them. Although he can select any particular mixture of available factors he desires, the final product he offers the public is as much influenced by the supply schedules offered to him as by his own decisions and organization.

Most discussions of housebuilding stress the importance of this role played by the factor suppliers in the structure and efficiency of the housebuilding industry itself. Many previous studies have argued that efficiency in housebuilding cannot be improved until a solution is found of the problem of control by suppliers over building processes.[1]

This study has already described housebuilders' uses of the particular factors of supply and housebuilders' relations with suppliers. To evaluate the specific influence of factor supply on housebuilding efficiency, we also need to have at least a partial picture of the supplying industries themselves. The description of their organization which follows is confined to data required for the subsequent efficiency evaluations.

Materials and Their Distribution

The fact that 40 per cent of the selling price of the small builder's typical Bay area house is expended for materials purchased by the builder and his subcontractors dramatizes the predominance of the

[1] For a basic statement of this thesis, cf. the conclusions of Colean, *American Housing,* pp. 314–315; cf. also Grebler, *Production of New Housing,* p. 53.

materials factor in the supply picture. The efficiency and organization of the materials-supply industries have an important bearing on the efficiency and organization of the housebuilding industry (table 51).[2]

Studies of the building materials industries have tended to be very critical, but they have often been superficial, lacking detailed and accurate data. One source of this hostility was the price situation, in which many building materials prices seemed to be administered and rather inflexible. Furthermore, charges of monopoly and restraint of trade have been brought against building materials firms, with decisions in many cases won by the government. These suits have been directed against control of patents, basing point systems, joint selling agencies, and illegal use of trade associations.[3]

No attempt can be made here to discuss all these charges in detail, since each would require information as extensive in scope as this entire study. It should be observed, however, that present opinion recognizes the complexity of the problems involved and is not willing to condemn the industries on the extraneous bases previously used.

This discussion is restricted to three areas in which sufficient data are known. The first is the type of industries producing building materials and particularly the type of market control existing within them. The second is the number and variety of the local channels of distribution for building materials. The third is the recent price history of building materials. Rather than covering all the hundreds of possible products which might be used in a building, this description concerns the 23 major industries, as defined in the Standard Industrial Classification of Manufacturing Industries, which furnish the principal items entering into Bay area houses.

In examining a conglomeration of factors such as building materials, it is vital that some attempt be made to relate them quantitatively. The importance of each on the total must be considered; monopoly in marble, for example, would affect housing prices only slightly if at all, whereas one in lumber would have immediate and large-scale repercussions.

One approach to the problem of these industries is through a consideration of their markets. Recent discussion indicates that market

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[2] See Appendix I.

[3] Cf. Thurman W. Arnold, U. S. Attorney General, "Restraints of Trade in the Building Industry," address at New York Building Congress, N.Y.C., June 21, 1939 (mimeographed by Department of Justice).

control and characteristics are strategic in explaining differences in competitive and price behavior.[4] This appears to hold true in the building materials industries. Those which have similar market characteristics follow like paths in competition and price patterns. All building materials are, of course, producers' goods, and the amount of product differentiation is slight. Several carry brand names, but they disappear into the final unit and are not known to the ultimate purchaser.

By means of data recently made available on the ratio of concentration of output in industries, it is possible to classify building materials producers in accordance with their degree of market control.[5] It appears from this classification that housebuilding materials are produced in far less concentrated industries than most industrial goods, and consequently firms producing them have less than an average degree of market control (tables 53–55).

Lumber, millwork, building paper, cast-iron pipe, paint, lighting fixtures, bricks, and furnaces and hot water heaters—items making up 60 per cent of the cost of the building materials going into a Bay area house—all come from industries in which the eight largest firms controlled only minor proportions (less than 36 per cent in 1947) of total production. These industries produced more than half the value of output of the 23 industries making housebuilding materials.

In each of these industries with a low concentration of output, competition has been relatively intense. Prices have varied and have tended to fluctuate rapidly. Attempts to diminish competition have been made primarily through trade associations. Except in shortage periods, they have not been very successful. In most of these industries, large builders can and frequently do enter into the fabricating end themselves. As a result, they can combat restrictions directly. Whether for this or other reasons, builders report that effective competition exists in most of these industries.

It may be argued that including all these industries in the non-concentrated group is ambiguous because some of them are industries for which the national concentration is low but which have high re-

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[4] Joe S. Bain, "Price and Production Policies," in (Ellis, H., ed.) *A Survey of Contemporary Economics* (Philadelphia: Blakeston, 1948).

[5] Subcommittee on Study of Monopoly Power, House Committee on the Judiciary, *Study of Monopoly Power* (81:1), Serial No. 14, Part 2-B, p. 1436.

gional concentration, whereas others may have great concentration in the particular sphere of our interest (Appendix I).[6]

Industries for which the national concentration ratio is low, but which produce primarily on a local or regional basis include cement, lighting fixtures, and bricks. The latter is particularly typical of this group. Whereas the country's 8 largest brick firms control only 17 per cent of national output, the 6 brick manufacturers in the Bay area—and there are only 6—control 100 per cent of local production. Because of high transportation costs, competition from distant producers is negligible. Industries in which a variety of products is manufactured at different levels and in which the concentration ratio may consequently not be significant include steel water pipe, sheet metal, electrical wiring, and warm-air furnaces and hot-water heaters (tables 53 and 54).

Removal of these seven regionally concentrated and mixed-product industries from the previous totals causes no important change in the general picture. Altogether they make up only 14 per cent of the materials going into the typical house and 29 per cent of the value of all building materials manufactured. Even excluding these industries producing 14 per cent of a house's materials because they are local or special cases, 74 per cent of the materials going into the house still have a concentration ratio of less than 70 (51 per cent less than 30) and only 12 per cent have a ratio of more than 70 (table 54).

The industries in which concentration is high and entry appears to be difficult include gypsum with a concentration ratio (8 firms) of 94 per cent; plumbing fixtures, 82 per cent; window shades, 83 per cent; linoleum, 94 per cent; window glass, 98 per cent; and ceramic tile, 70 per cent. As mentioned above, these make up less than 12 per cent of the materials cost of the house. Close behind these is roofing material, whose concentration ratio is 65 per cent. Its market behavior is similar to the more concentrated group. Most of these high concentration industries would be considered oligopolistic, and observed market results appear to follow the pattern found in other goods with concentrated control—relatively stable prices, use of basing points, strong distributor tie-ups, and the like (table 53).

[6] For a discussion of these problems, cf. Joe S. Bain, "Relation of Profit Rate to Industry Concentration: American Manufacturing 1936–1940," *Quarterly Journal of Economics,* Vol. LXV, no. 3 (August, 1951), 293–324.

Finally, there are the items whose concentrations fall in between the high and low concentration groups. These are primarily steel products and also electrical supplies and building hardware. They follow a mixed market pattern. Mill prices on these items are usually regulated, making it difficult for builders to obtain discounts at that level. On the other hand, their distribution—through jobbers, wholesalers, or direct from the mill—is far more flexible, so there is variation in delivered prices, and the bargaining power of the individual builder helps to determine his delivered price.

Differences in the market control of building materials are frequently reflected in the second area under discussion—distribution channels. Most important in this area are the materials dealers who furnish goods to the small builders and trade contractors. These are called either retailers or wholesalers, depending on their particular line. But irrespective of the name, they generally perform the same functions. They receive car lots from the manufacturer, store them, and deliver the desired quantity to the contractor at the site of construction. They may or may not also sell over the counter to individuals.

Another group which sometimes appears in the chain of distribution comprises the brokers or wholesalers who sell to materials dealers and occasionally to the large builders. In certain cases they own warehouses and carry stocks. For example, in specialty millwork and hardware, where the materials dealer does not use enough of certain items to make carload purchases, a wholesaler handles the assembling and stocking of the items. In other instances, the wholesaler is a mere broker or salesman, taking the place of direct factory agents. He does not accept title, furnish warehousing, or perform any similar functions. His pay must be competitive with the cost to the factory of performing this function through its own staff. Margins paid to the broker for the performance of these services normally run from 3 to 5 per cent, rising to 8 or 10 per cent on items which the wholesaler carries in stock.

In the San Francisco area in 1948 there were at least 625 wholesale dealers in building materials. About two-thirds of them were merchant wholesalers with warehouses or yards, and the rest of them were divided quite evenly between manufacturers' sales branches which also carried stocks, and brokers or agents who did not.[7]

[7] 1948 Census of Business, *Wholesale Trade,* Bulletin No. 1-W-4, table 102.

The business of these wholesale dealers was not, of course, confined to selling to housebuilders. In several lines, such as electrical supplies and hardware, sales for installation in new houses made up only a minor part of the dealer's total business. In other cases, however, many wholesalers in particular lines did most of their business with builders or trade contractors.

In addition to buying through wholesalers, many builders bought from retail lumber, hardware, and building materials dealers, of whom there were more than 800 in the area. At the other extreme, some of the largest builders bought directly from mills.

The number of possible sources of supply for most items had an important bearing on the actual channels used by builders and on the prices they paid. The more sources a builder has available to him, the less likely it is that uneconomic methods of supply will continue to exist. Where numerous alternative sources of supply exist, it usually requires illegal collusion to maintain inefficient systems, and where the number of firms involved is large, it is difficult for illegal practices to be carried on successfully. The large total number of sources, however, is not in itself a guarantee of alternative sources for each material. The number of wholesalers of a product is related directly to the number of producers of that item. Products stemming from highly concentrated industries were likely to be distributed through a minimum number of trading units, whereas items originating among a large number of producers were likely to be channeled through a similar proliferation of distributors.

The final important area of the materials industries under discussion is their type of price movements. Figure 7 shows the movement of all wholesale prices, of wholesale prices excluding farm and food products, of all housebuilding materials prices, and of lumber prices.

Costs of building materials have depended upon the type of industry from which they were drawn. Relative price changes for these supplies have been determined by the kind of material going into the product, the importance of raw materials compared with plant and labor costs, and the competitiveness of the particular industry. These elements have also affected the particular building material industry's ability to expand. The less competitive industries generally have been those using materials which require more work to be done in plants and furnish more highly fabricated products. Because of fixed plant costs,

they have expanded more slowly, and their prices have been more stable, but there have been occasional shortages and resultant black or gray markets for these goods. The more competitive industries have been those furnishing goods in a form closer to the raw material. These have expanded more rapidly, and their price fluctuations, moving in

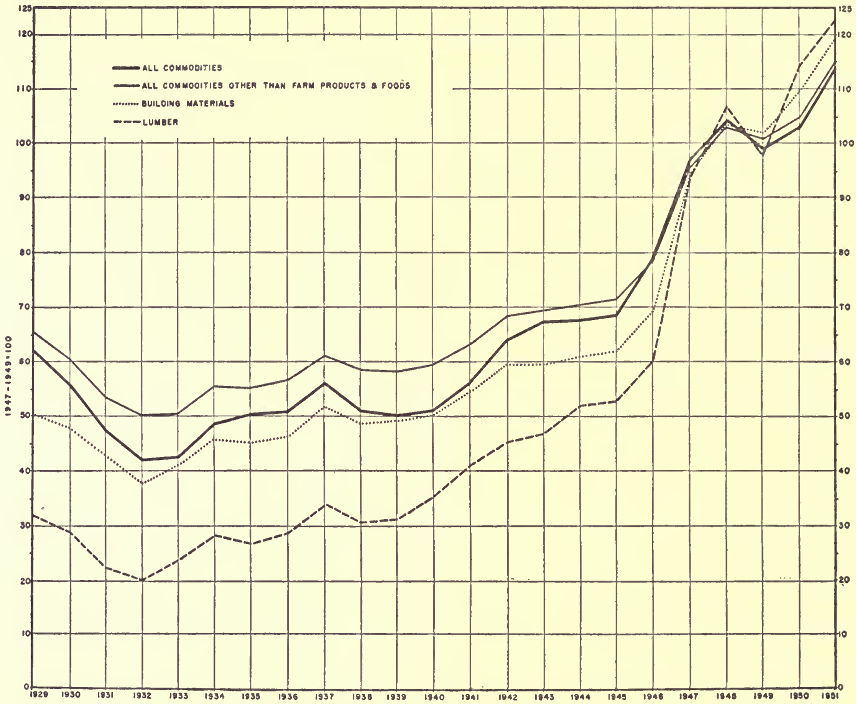

Fig. 7. Wholesale price movements—all commodities, lumber, and other building materials. Source: Bureau of Labor Statistics.

accordance with those of other raw materials, have been wider. Also, there has been a somewhat more elastic supply.

Most vivid is the manner in which lumber prices have differed from other wholesale prices (fig. 7). Lumber prices have moved in a far more volatile manner than other prices, and since 1940 they have become relatively much higher. Lumber has had large demand fluctuations, and it is produced in a very competitive industry, falling between farming and mining in its mode of production. Some lumber comes from large commercial operations in which the basic cost is labor and stumpage. Some comes from individual farm wood lots.

The impact of large demand changes on lumber is similar to that on many farm products with resultant wide price fluctuations. At the same time, a greater rise in price has occurred because of a rapid increase in rates paid labor, together with a decrease in accessible stands of trees. As a result, lumber prices have fluctuated sharply but around a steadily increasing level.[8] Lumber prices rose by 250 per cent in the decade of the 1940's—the largest increase for any major commodity.

Other building materials are produced in industries whose price movements differ but little from the average of the economy. The price fluctuations for these other materials have not varied much from those of other commodities except in the two periods when building demand rose more rapidly than general demand. From 1932 to 1937, other building materials rose more slowly in price than the total wholesale price index but somewhat faster than nonagricultural products. From 1937 to 1947, these materials again rose more gradually than the total index, but at the same rate as nonagricultural products. Then from 1947 through 1951, as a result of the concentrated increase in construction demand, the prices of building materials, excluding lumber, rose at a more rapid rate than did those of other commodities.

Price movements of these other housebuilding materials fall between those of lumber and those of all other materials. Since lumber represents nearly 40 per cent of the total cost of housing materials, it is plain that building materials as a whole have risen far more rapidly than wholesale prices in general.[9]

The Trade Contractors

Next in importance to building materials as a supply factor in housebuilding is subcontracting, which accounts for almost half the builder's direct costs. Thirty-six per cent of the final sale price of the typical house is paid to the subcontractors.[10] It is, therefore, important

[8] For a complete description of the industry and a discussion of these points, cf. "The Lumber Industry of the Pacific Coast," *Monthly Review of the Federal Reserve Bank of San Francisco,* Supplement, December, 1950.

[9] The reactions of prices of building materials to change in demand are similar to what would be expected on a theoretical basis. Prices react to many variables, but particularly to changes in factor price and demand. For an exposition of this whole topic and the unreliability of attempts to equate price movements and concentration or competition, cf. Alfred C. Neal, *Industrial Concentration and Price Inflexibility* (Washington: American Council on Public Affairs, 1942).

[10] See Appendix G.

to understand the working and organization of this major element in the housebuilding process.

Many writers have denounced the subcontracting system as a hindrance to the development of efficient construction methods. They charge that the builder, by involving himself in difficult problems of coördination, loses direct control of essential parts of the building process and plunges himself into an unstable situation. In the discussion of the operations of the various sizes of builders, however, it was brought out that the relations between builders and subcontractors are normally quite stable. Together, the builder and his subcontractors form an organizational unit, albeit an informal one. No serious difficulties arise in this organization except in periods of shortages. Although coördination of subcontractors' work does at times become troublesome, the system is thought to be more efficient by even the largest builders than the alternative policy of integration, under which the builder would attempt to handle the specialized jobs himself. Integration remains very rare at all size levels.

Assuming, therefore, that subcontracting is more efficient than integration, there are two aspects of the actual workings of the system to be considered here: (1) the structure of the trade-contracting industries and the relative bargaining strength of the builder vis-à-vis his trade contractors; and (2) the manner in which the trade contractors perform their tasks.

If previous information on housebuilders was slight, that on trade contractors, both in this area and elsewhere, was almost nonexistent. No one has known how many trade contractors there are, which types are the most numerous, what the size of their businesses is, how they divide their work between housebuilding and other activities, or how they operate. In order that information might be obtained on these fundamental points, a special survey of trade contractors in the San Francisco Bay area was conducted. The methods used and the tables showing the exact results may be found in Appendix G. (As indicated because of cost limitations, the survey covered only 5 of the trades which work on houses. These trades, however, contained a majority of all licensees and accounted for about 72 per cent of the cost of subcontracts for the typical house. The appendix describes the manner in which the data for these trades have been applied to the totals.)

About 75 per cent of all firms holding a trade-contracting license indicated that they were actively working in the trade as a separate

proprietorship, partnership, or corporation. The remainder of license holders did not use their licenses; they were retired, working for others, or working in other trades. Statements here about the number and attributes of trade-contracting firms are based on the percentage reporting active use of licenses. The picture which develops is one of firms very similar to housebuilders themselves, with related problems of size and methods (table 42).

By far the largest category of trade contractors is painters. It accounts for 36 per cent of the outstanding licenses and nearly as high a percentage of active firms. Next most numerous are plumbers, with about 11 per cent of the licensees, and electricians with the same percentage. Following this in terms of licensees come the plasterers and roofers, with about 6 per cent, and the ceramic tilesetters with about 4 per cent of the total. The masonry, wood flooring, sheet metal, and cement and concrete firms each have between 3 and 4 per cent, and the excavating, landscaping, and warm-air heating specialists claim between 2 and 3 per cent. Finally come the cabinetmakers, glazers, lathers, sewer installers, and soft tile and linoleum workers, each with less than 2 per cent of the total.

What do these trade-contracting firms consist of? How large are they, both absolutely and relative to each other and to housebuilders? The various types of trade contractors have been divided into four groups according to the total annual volume of business reported: (1) smallest firms doing less than $10,000 in volume (these are primarily one-man firms doing repair and maintenance); (2) small firms whose volume was between $10,000 and $50,000; (3) medium-sized firms with business running between $50,000 and $200,000; and (4) large firms which top that amount (table 43).

Important variations exist among trades. Most conspicuous is the average size of the painters, half of whom are in the smallest category as compared with about 20 per cent for the other trades. Floorlaying has nearly as high a percentage of small firms as painting, though a far lower one in the very small group. The cement and concrete contractors and the plumbers have the largest percentage of very large firms. These distributions are directly reflected in each group's median volume, which ranges from $10,000 for painting and $24,000 for floorlaying, to cement and concrete at $37,000, masonry at $38,000, and plumbing at $41,000.

Dollar volume as a measure of size has the disadvantage of being affected greatly by the magnitude of purchases made by the firm. This is a business component which varies according to the type of work done. For example, the painters' materials cost relatively only half as much as those of the other trade contractors; consequently their size appears small on the basis of dollar volume, but less small when based on a measure more nearly reflecting actual work, such as labor. For this same reason, trade contractors appear small in comparison with builders when measured by dollar volume. Since the builder's sale price includes payments for subcontracts and land, his dollar volume per employee is relatively high. Only 38 per cent of builders have a volume less than $50,000 as compared with 71 per cent for trade contractors; 45 per cent of builders have a medium dollar volume compared with 19 per cent for the subcontractors; and 17 per cent of the builders are in the large category as compared with 10 per cent of the subcontractors. The number in the largest group with a volume of more than half a million does not differ greatly. The median volume for all builders is about $72,000, or more than twice as high as the median volume for trade contractors (tables 11 and 43).

If the number of employees is used as a measure of size, the relationships among trade contractors appear slightly altered. Such a distribution brings out, too, the prevalence of firms with no employees, in which the owner does all the work himself. Firms with fewer than 5 employees may be considered as small. By this measure, the disparity between the painters and the other trades diminishes. On the other hand, the masonry contractors have an even greater concentration in the larger-sized groups. Based on employment, the size distribution of builders and trade contractors is roughly similar. Omitting painters, the majority of whom are engaged in repair and maintenance work, and considering only firms active in housebuilding, it is found that trade contractors usually have more employees and are somewhat larger on the average than the builders (tables 12 and 44).

The number of small trade contractors is not surprising, but it is economically significant, when coupled with the large number in each trade-contracting group. It indicates the possibility (and also probability) of competition with fairly equal bargaining power. The large number of small trade contractors also indicates the possibility of large builders being able to bargain with fairly small subs. This is a major factor in making nonintegration cheaper than integration.

The generally high correlation in size of firms by both dollar and employment measures, as well as the somewhat lower volume of business per employee in painting, is illustrated again when painting contractors and cement and concrete firms are cross-classified by dollar volume and number of workers at the site. In cement and concrete, firms with a volume of business less than $10,000 all consist of self-employed workers acting as trade contractors with no other employees. In the painting business, though most of the smallest firms are also simply self-employed mechanics, in about a third of the cases small employers do have an assistant working with them. This same tendency of painting firms with a given volume of business to have more employees than contractors in other trades is noticed throughout the field.

In the subcontracting picture, the relationship of trade contractors to the housebuilding industry is of primary concern to this study. All firms surveyed were requested to report the division of their volume between work on new houses, on new buildings of other types, and on remodeling, repair, and maintenance. What is the relative size of the trade contractors specializing in work on new housing? It was found that this varies from trade to trade (tables 46 and 47).

About a third of the active trade contractors in the area do little or no work on new houses, about 26 per cent concentrate 70 per cent of their work primarily in the new housing field, whereas the remainder have their work spread evenly over both fields with the importance of housebuilding in their total volume varying from 10 to 70 per cent. Conversely, about 36 per cent of the firms concentrate primarily on repair and maintenance, about one-fourth do no repair and maintenance work, and the remainder spread their work over both.

Translating these percentages into the number of active trade contractors in the area shows that about 1,100 trade contractors concentrate most of their effort in housebuilding, about 1,300 do mainly repair and maintenance, and the remaining 1,200 split their effort between the two types of work. This means, then, that there are about as many trade contractors active in housebuilding as there are housebuilders. Each trade contractor works on many more houses than each builder, but puts in correspondingly less work per house.

The importance to housebuilding of various-sized firms in any category of trade contracting depends upon the relative volume of work

on new housing compared with remodeling, repair, and maintenance jobs and with nonresidential building performed by the trade as a whole. In addition, the type of organization and skill required to do large commercial, institutional, or industrial jobs will affect the size of firms.

In almost all trades the smallest (primarily one-man) firms are concentrated in remodeling, repairs, and maintenance. The only exception is masonry and, to a certain extent, floorlaying, where the amount of repair work is not great and where, therefore, even the smallest firms do a large amount on new buildings.

In masonry, a sharp dichotomy occurs between the small and medium firms and the large ones. The small and medium firms concentrate almost entirely in new housing, whereas the large ones specialize in big nonresidential projects. The building of fireplaces is the primary masonry job in new houses, and in this the small and medium firms appear to be most efficient. Bigger jobs require the capital and organization of the large firms.

Floorlaying firms form another pattern. Here, firms of every size work primarily in new housing. Even the largest are concentrated in housebuilding, presumably because of the relative unimportance of hardwood floors in nonresidential buildings.

Painting and plumbing firms resemble each other in organization. In each, total volume is characterized by a large amount of maintenance and repairs. For each, the organization required for handling large industrial and commercial buildings is rather great. As a result, firms active in new housebuilding fall primarily into the small- and medium-size classifications. Even among these, however, the actual number of firms specializing in housing is still only 15 to 25 per cent.

Almost no large painting firms specialize in housing; they depend upon maintenance work or specialize in large new commercial building. Painting in the new nonresidential work seems to be concentrated in the larger firms. Large plumbing firms are divided into three nearly equal groups—one specializing in new housing, one in other new buildings, and one doing all types of work including a good deal of repair on existing buildings. Again, the problem of bidding and successfully completing work on large structures apparently requires a special type of knowledge and organization so that only large plumbing firms enter this field.

Cement and concrete contractors are about average in size distribution compared with the other trades. The smallest firms do little work on new buildings. About 31 per cent of the small and medium firms concentrate on houses, and almost all in these size groups do a fair percentage of work in new housing. The large firms are spread evenly through the three types of work.

In summary, it is apparent that most trade contractors working on new houses come from the small- and medium-sized firms in each specialty. About 40 per cent of the firms in these groups do specialize in housing work. On the other hand, the smallest firms in every category work primarily on maintenance, repair, and remodeling jobs. Among the largest firms, most flooring outfits specialize in work on housebuilding. Large cement and concrete, painting, and plumbing firms do some work on houses, whereas very few masonry firms do any.

Although the absolute number of large and medium trade contractors at work on new housing may be relatively small, as with housebuilders, their percentage of the total volume may still be high. In flooring and plumbing, the large firms account for more than half the total work on new housing, partly because the volume of work per house in these trades is high, and partly because the methods and type of organization used on tract work differ markedly from those used in scattered houses. Specialists in tract work have arisen particularly in plumbing. If a firm obtains the contracts on several tracts, its volume becomes large. Since the average house built in the Bay area is in a tract, it is easy to see how such firms can account for more than half the total house-plumbing volume.

In cement and concrete and in painting work, the largest firms account for only 20 to 30 per cent of total work in new houses. In both these trades as well as in masonry, the medium-sized firms do the bulk of the housebuilding jobs. The small firms are primarily important in masonry (40 per cent of dollar volume). In the remaining trades, though the small firms comprise more than 50 per cent of the firms working in houses, their percentage of dollar volume is less than 10.

Trade-contracting firms, like housebuildings firms, have a very small number of overhead workers. Firms were asked to state the number of employees or members of the firm working in a supervisory, sales, or other off-site position and doing no direct labor at the site; or, alternatively, to indicate whether the firm had no off-site employees and the

owner did all off-site work in his spare time. The latter proved to be the more prevalent situation; in almost three-fourths of the firms, off-site work was performed by the owner in his spare time (table 45).

The one important exception to this general proportion occurs in the plumbing trade. The plumbers' union has a rule that a union employer may not work with the tools for more than four hours on a job, and then only on maintenance and repair work. This regulation accounts for the much smaller percentage of plumbing contractors reporting overhead work done in spare time. In fact, the question may well be asked: How does one account for the large number of plumbing contractors who report that they spend full time on the site? One-tenth of the number is simply accounted for—they are self-employed plumbers with no employees. The remaining firms average a single employee, and are probably nonunion shops working chiefly on repair and maintenance jobs. Because of a shortage of journeymen during the period surveyed, the union was not strictly enforcing the regulation against an employer's working.

One-third of all firms reporting no overhead personnel were self-employed owners with no additional employees. The percentage without employees was lowest among the masons where, except for very simple jobs, a hod carrier increases efficiency. In addition to the 70 per cent of firms having no overhead workers, 12 per cent reported that the owner spent full time on overhead functions but had no additional aid. The remaining 18 per cent had employees doing overhead work, but their number remained small. Only 6 per cent of all trade contractors had five or more people in their overhead structure.

Trade-contracting firms do their work over a much wider area than builders. With the exception of plumbers, a majority of all trade contractors worked in at least two or three counties. (It will be recalled that only 10 per cent of housebuilding firms worked in more than one county.) Furthermore, the large trade contractors frequently may take work anywhere in the state and occasionally outside it (table 48).

The spread in area occurs partly because of the need to work on many more jobs than do builders, since each job is smaller. At the same time, it is made easier by the relative lack of heavy equipment that has to be moved. This ability to move around increases the competition in these trades. It may also bring in some problems of labor jurisdiction and may require numerous nuisance outlays in the form of licenses and permits in every area in which work is done.

In their methods of estimating, bidding, controlling, and scheduling their work, trade contractors divide sharply into two groups, depending upon the manner in which their work is performed in the house. The first group includes the trades whose tasks are simple, specialized, and done in a uniform manner even though performed on all sorts of houses. The problems of laying floors and linoleum, of shingling or roofing, of plastering, and of finishing cement do not vary. In this group, estimating, bidding, controlling, and scheduling are based almost entirely on a unit-in-place method. All controls are built up from knowledge of a standard basic unit. Thus the floorlayer, roofer, or plasterer knows from past experience the labor cost for installing a square foot of floor, a square yard of plaster, or a square of shingles, and the prevailing materials costs. His estimating job is fairly easy. The second group of trade contractors includes the trades whose tasks are somewhat different in every house, though variations may not be great. These are trades such as plumbing, electrical work, excavating and grading. Their estimating job is more difficult.

Over and above these differences, both these groups take greater care in estimating when they are planning work on a tract for a medium-sized or large builder than when they are planning work for a small builder. It is, naturally, more worth their while to take the extra pains in planning for the larger number of units. This additional effort often pays off in time, labor, and materials savings. The estimates in both groups serve as the chief guide in production control and scheduling.

For the first group of trade contractors, whose work is figured in standard units, the repetition of jobs throughout a tract facilitates controls. The trade contractor can estimate the exact amount of materials that will go not only into each house but into the entire group, and the exact amount of labor time to put them there; he can use his best workers in the first several houses to develop a labor pattern for the tract; he can instruct his less skilled, or new men, to follow this pattern; he can schedule all his men so that they have a specific amount of work to do per day; and he can control their work by seeing that the amount of time they claim does not exceed his estimate.

For the second group of trades, whose tasks vary somewhat for each differently designed house, the factor of repetition in tract work is even more important to scheduling and control. For instance, in

plumbing there is a definite change in technique as scale increases. Since every job differs on scattered houses, work is done on a custom basis. Measurements are taken, pipes are cut to length, and joints made in the house. In a tract operation, the plumber sets up a site fabricating shop. All steps for the entire unit are carefully planned. Within the shop, heavy pipe-cutting machinery is used to cut almost all pipes to their proper length. At the same time, a certain number of the main joints are prepared. The material is then distributed to each house ready for final installation. This change in technique can save 20 per cent or more in labor. As with carpentry, precutting and preassembling enable the plumber to use less skilled mechanics on the more repetitive tasks. At the same time, it increases the efficiency of scheduling and control.

Emerging from an examination of trade contractors is the close resemblance that they bear to builders in most aspects of their operation. In both cases, the smaller firms exhibit the problems of lack of management skill engendered by low overhead. In both cases, the larger firms display the advantages of dynamic growth and of improvement in methods. In the case of trade contractors, however, the level of increase in efficiency with increased size of firm probably remains below the average for large builders. Trade contractors, on the whole, have not adopted new methods with increased scale as rapidly as builders, perhaps because of their still low overhead. They use approximately the same amount of machinery on all jobs and often hesitate to adopt new machines and methods of materials handling.

It should be stated, in fairness, that variation in methods is great, and that the knowledge required to test the efficiency of any specific potential change is frequently lacking. In some instances it may be that, being specialists, they are already using highly specialized methods and equipment. In addition, there are important recent examples of increased use of machinery with scale, such as heavy pipe-cutting equipment on large plumbing jobs, taping machines, and machine trowels.

Whatever the efficiency of the trade contractor may be, it is only rarely that the builder can exercise any influence toward improving it. Most builders do not have the time or supervisory personnel to analyze the trade contractors' problems. Only a few large builders would be in a position to do this, and for them it probably would not

be necessary, since the trade contractors on large-scale projects doubtless have grown sufficiently to perform this task themselves. Most builders must accept what the subcontractors offer and content themselves with the knowledge that it is probably better than they could do themselves.

Labor

Twenty-eight per cent of the cost of the typical house is paid to on-site labor.[11] This amount varies somewhat, depending on the degree of custom work, the degree of finish of materials when they are purchased, and the efficiency of the firm's management. A description of the factor of labor in housebuilding's supply picture must include discussion of four questions: the amount of labor available; the type of workers; the wage rates charged; and finally, the manner in which the workers are organized. These elements comprise the relationships with which the builder must deal in planning his organization and production processes. If the supply, quality, or price of a particular kind of labor is unsatisfatcory, the builder may attempt to substitute other factors by changing the production process, altering the location at which labor is applied, or varying the type of skills required. His ability to make such changes depends upon the institutional structure of labor's organization.

The first condition to be considered is the size of the labor force and the changes that have occurred in it. This condition affects the number of houses that can be built as well as the efficiency wages that will have to be paid. A problem common to most other factors of supply arises again in studying the housebuilding labor force—the difficulty of defining the group concerned and of separating labor employed in the housebuilding industry from construction labor in general. It has been observed that trade contractors move freely among housebuilding jobs, other construction, and maintenance or repair work; it follows that the labor they employ performs its tasks on the same diversified projects. Workers who do not remain with one firm but migrate from job to job find themselves engaged on all kinds of construction which can use their particular skill. Organization of labor in the construction industry takes account of this overlap between types of work. Unions recruit workers employed on all kinds

[11] See Appendix J, and tables 57–59.

of construction work, and labor contracts are entered into between unions and employers representing all types of construction firms.

For estimating the number of workers employed in housebuilding, the basic source is the preliminary report of the last Census, which enumerated 68,000 people engaged in the construction industry in the San Francisco Bay area in April, 1950. Approximately 10,000 of this number are estimated to have been employers and own-account or force-account workers. The remaining 58,000 were engaged by private firms in the construction and housebuilding industry. Of this number approximately 40,000 worked on new houses, though they may also have done other kinds of construction work. These workers were approximately divided evenly between those employed by housebuilders and those employed by special trade contractors (table 57).

The number of construction workers reported by the Census for California was 316,000 whereas the national total was 3,480,000. These figures include all types of workers besides those engaged specifically on housebuilding.

Data on which to classify construction employees nationally are difficult to obtain. The Bureau of Labor Statistics reports, based on Social Security bench marks, indicate that more than 80 per cent of workers in the construction industry are employed by building contractors or special trade contractors. Of this number, about 42 per cent (35 per cent of the total) are employed by builders and the remaining 58 per cent work for trade contractors. They construct all types of buildings and do maintenance and repair work as well. Work on new housing actually takes slightly more than half their effort.[12]

The employment figures for the San Francisco Bay area reflect both the increased importance of construction in the postwar period and the general expansion of California's and the nation's labor force. In 1950, construction employment both in the Bay area and in California was up more than 105 per cent compared with 1940, whereas the total United States construction force rose 70 per cent in the same period. At the same time, total employment in California rose 58 per cent, compared with 25 per cent for the country as a whole. In both the Bay area and the State of California, construction employment in 1950 made up about 8 per cent of the total employment—a much

[12] Construction employment is reported in the *Monthly Labor Review,* June, 1951, table A-2. Relation of labor to value of work is reported in *Construction* of January, 1951.

greater percentage than construction workers manifested nationally (6.2 per cent) or in the Bay area and state in 1940 (6 per cent) (table 57).

The rapid growth in the labor force has played an important part in the total housebuilding field. Although construction is usually considered to be a skilled trade requiring long practice, the need for labor can be met fairly well when demand rises. During most of the postwar period, the labor supply was tight but, except for a few special crafts, the tightness was no worse for building trades than for skilled labor in general. In addition to drawing from other fields, housebuilding gains additional flexibility by being able to hire workers rapidly from other types of building. These shifts within the building field can be particularly important in local areas.

As might be expected, the rapid increase in the number of workers affected the second labor condition under discussion. Both the composition and quality of the whole shifted greatly. The influx of new workers caused a general lowering of labor quality and efficiency, marked by a decrease in the level of skill. Men had to be, and were, trained rapidly, but there was not time to develop them into the versatile craftsmen found among the old-timers in the trades.

The labor force of the construction industry differs in two important respects from that of other industries. First, because of the heavy nature of the work, construction labor is composed almost exclusively of men, whereas in many industries, such as manufacturing, nearly a quarter of the employees are women. Second, the average skill—and consequently the average age—of construction workers is higher. In California in 1947, even with the tremendous influx of laborers which had already occurred, the average age of male construction workers was 38.2 years. Those employed by builders were somewhat older than those employed by special trade contractors—38.8 as compared with 37.4 years. The average age for all male workers in the state was 37.1, whereas in manufacturing employment it was 36.7 years.[13] Thus it may be seen that the average employee of a building contractor is two years older than his counterpart in other industries, although the work he does is likely to be more exposed and more difficult than elsewhere. Another statistic pointing up this age differential is that 25 per cent

[13] Department of Employment, State of California, Research & Statistics Section, *Bulletin 31*, table 29, "Workers with Earnings Sufficient to Qualify for Benefits in Insured Employment in 1947."

of building employees are more than 50 years of age, compared with 20 per cent of those employed in manufacturing.

The third condition of the labor supply—cost—affects housebuilding directly. Changes in payments for labor vary with efficiency as well as with wage rates. The efficiency with which employees work is difficult to measure, and the only knowledge available on labor cost is of the actual changes in wage rates on the basis of hourly or weekly earnings.

The earnings of construction workers are somewhat higher than are those of employees in other industries. For instance, employees of builders in the United States earned an average of $68.56 per week worked in 1950 and those of specialized trade contractors earned $77.77 per week, compared with an average of $59.33 for all employees in manufacturing industries. This means that builders' employees earned 16 per cent more per work week than manufacturing labor, and special trade mechanics earned 31 per cent more. To achieve these earnings, building workers put in, on the average, fewer hours per week than other employees. In 1950 employees of building contractors worked 35.8 hours and those of special trade contractors 36.7 hours a week, compared with 40.5 for manufacturing workers. These lower average hours reflect not only a shorter work week, but also weather and scheduling problems and more time between jobs (table 58).

Since the work week is shorter and the average weekly earnings greater in construction, it is plain that the hourly pay rates are higher than in other industries. Builders' employees make an hourly rate 31 per cent higher than manufacturers'. The increase in hourly earnings of building employees since 1940 has been slightly less than that of manufacturing employees—109 per cent as against 122—but the increase in the postwar period from 1946 to 1950 has been nearly equal at 36 per cent.

All the foregoing figures and comparisons should, of course, be considered with care and discrimination and in their context. Although they are indications of the cost of labor to housebuilders, they are not an indication of greater annual earnings over a long period of time or of undue prices for building labor. The statistics report the earnings of those actually employed in selected weeks. If building workers had had more weeks of unemployment than those in other industries during the period studied, as they probably did during the prewar period,

their total incomes would be relatively less. But since the war, unemployment has not been a characteristic of the construction industry, particularly for the special trade employees, who have both higher earnings when working and a higher likelihood of uninterrupted employment. With regard to actual rates for building labor, the differential must cover the costs of the sex and skill differences between construction and manufacturing workers. In other industries whose labor force is primarily made up of skilled male workers, a similar differential is noted; for example in copper and bituminous coal mining, brewing, printing, industrial chemicals, petroleum products, and various metal and machining industries that have the same type of sex and skill requirements as the building industry, workers' earnings are equivalent to those of building workers.

The statistics just presented are based on national payrolls and earnings. California building workers received somewhat higher wages, as did California workers in general. Specifically, builders' employees in California earned $73.05 per week in 1950, or $4.49 (6.5 per cent) more than the national average. Employees of special trade contractors in California earned $85.51, or $7.74 (10 per cent) per week more than the national figures.

It has already been pointed out that this higher average earning figure may be reduced to some extent through time lost between jobs. It is known that the turnover rate for building employees is somewhat higher than that for other workers, but the rate is not as high as is frequently supposed. In 1947—the only year for which figures are available—the average worker employed by builders worked for 1.63 employers in each quarter. As would be expected, trade contractors' mechanics had a lower turnover rate, averaging 1.48 employers per quarter. Although this rate may look very high to the inexperienced eye, it is not much higher than that for other groups. The rate for all employees in industries covered by unemployment insurance was 1.32 per quarter, whereas in other service industries it was 1.45—close to the rate for building. It should also be noticed that it is the rate per quarter that is important; the rate cannot be multiplied by four to get an annual rate because, for instance, a man working for the same employer throughout the year would appear as one in each quarter, and it is only on the quarterly rate that figures are available.

In addition to the number, characteristics, and earnings of building

labor, it is important to know something of the unions into which these employees are organized, since unions constitute a most important determinant of labor supply conditions.

The housebuilding industry in the Bay area is almost completely unionized. There are no known open-shop projects. On only a few jobs, and even then in only some crafts, are nonunion men employed. These exceptions to the general unionization are found in the small nonunion shops doing primarily maintenance and repair work. Unions in many crafts exclude small one-man firms which do not ordinarily work on new housing, as a matter of policy, but these small, nonunion shops do occasionally accept subcontracts on individual new houses. Consequently, such houses are built under partial nonunion conditions, but their number is so small and their importance so slight that no one pays much attention to them. Typically, the nonunion sub comes on the site when no others are there, does his work, and departs before others arrive.

In the Bay area, the union men in the industry are divided into twelve international groups with about 85 locals. The internationals are as follows:

- Bricklayers, Masons and Plasters' International Union of America
- United Brotherhood of Carpenters and Joiners of America
- International Brotherhood of Electrical Workers
- International Union of Operating Engineers
- International Hod Carriers, Building and Common Laborers' Union of America
- Wood, Wire and Metal Lathers International Union
- Brotherhood of Painters, Decorators and Paper Hangers of America
- Operative Plasterers and Cement Masons' International Association
- United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry of the United States and Canada
- United Slate, Tile and Composition Roofers, Damp and Waterproof Workers Association
- Sheet Metal Workers International Association
- International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers

Each of these unions has its own complex set of rules and procedures differing in varying degrees from the regulations of each of the others. They are all, of course, extremely important to housebuilders since they determine to a large extent the supply and cost of his labor.

The building unions have a reputation for ruthlessness, for striking over minor issues, and for becoming involved in an excessive number of jurisdictional disputes. The record of the postwar period, however, does not bear this out.

In the first five postwar years there were 1,126 strikes in all California industries. Of these, a total of 145, or nearly 13 per cent, were in construction. The number of man-days lost through strikes was 14,982,000 for all industries, of which 920,000, or 6.1 per cent, were in construction (table 59). These percentages should be considered in relation to the fact that about 8 per cent of all workers were engaged in construction and that the total employment figure includes those engaged in trade and agriculture, where strikes are very unusual. It is possible that, since this was a period of prosperity and labor shortage, building employers may have been more willing to agree to labor's demands whether they believed them reasonable or not. If so, this might account for the fact that construction strikes became an increasing part of the total, as prosperity and labor shortage diminished over a period of time.

The strike picture for the Bay area is similar, or possibly slightly more favorable. There were 12 strikes in the construction industry in this area in 1949 and 1950, costing a total time loss of 20,203 man-days, or about an hour of strike time per construction employee per year.[14] Of the 12 strikes in the Bay area, 11 were for wages or so-called fringe benefits, primarily travel pay and welfare funds. Only one major strike was jurisdictional. This occurred on a project where a fight developed between the carpenters and the roofers as to which group should lay composition shingles. Building on a large tract was halted off and on for short periods over a period of six months. A decision was finally handed down in favor of the roofers by the National Joint Board for Settlement of Jurisdictional Disputes.

Financing

The structure of the financing system for housebuilding is somewhat simpler than the organization of the industry's other factors of supply,

[14] Based on information in the files of the California State Division of Labor Statistics.

and a good deal more information about it is available.[15] The basic problem in financing houses is dual: to find sources of money for loans during the course of construction and to carry the owners of the new dwellings. Both construction and final loans are essential because usually neither builders nor ultimate buyers have sufficient funds to pay cash for such expensive items as houses.

In considering, first, the problems of construction loans, one finds that a narrow market for these funds is a striking characteristic of the Bay area. There were only about a dozen sources of money supply for tract-construction loans in the Bay area during the postwar period. These included six banks, one savings and loan company, two insurance companies, and three mortgage companies. The six banks actually accounted for about 90 per cent of the loans, and the two largest banks furnished more than half the total.

This allocation of sources in the Bay area construction loan market differs so sharply from the pattern in the rest of the country that it is worth examining. In most areas of the country, the construction-loan market is about evenly divided among banks, savings and loan companies, and insurance companies or mortgage companies. In the Bay area, where the market share differs so drastically, the savings and loan companies are much smaller and are chiefly interested in conventional loans at higher interest rates, particularly on older houses. Only one of these companies has actively entered the tract market. The Bay area mortgage companies and insurance companies have not, apparently, attempted to compete actively with the banks for construction loans, but instead have operated with or through them.

What accounts for the large share of the banks in this construction loan business? A chronology of the local market may help give the answer.

At the beginning of the postwar period, the banks were eager to obtain permanent government-guaranteed or insured loans. To attract the builders who generated many mortgages, and thus to obtain the permanent loans, the banks were willing to make construction loans without premiums and at low interest rates. The Bank of America, largest bank in the world as well as in the Bay area, was particularly active during this period. Other banks followed suit. After about two years of vigorously increasing mortgage accounts, the Bank of America

[15] See Appendix F, and tables 40 and 41.

apparently decided that its mortgage loans were sufficient for its portfolio. The other banks still desired loans, but no longer at the rapid rate at which they were being offered.

At this time, Eastern insurance companies still had large amounts of uncommitted funds and were willing to pay a premium on permanent government-guaranteed and insured loans. Local banks, which were doing business with the local builders, apparently decided to go on using their own funds for construction loans but to obtain the permanent financing from Eastern institutions. They continued to make construction and permanent loans, but they sold or assigned the permanent loans from their portfolios in the Eastern market at a rate which kept their loan portfolios constant.

When premiums for selling permanent loans began to disappear from the market, the local bankers were still willing to make construction loans, provided a firm commitment was obtained from some other source to take the permanent loan. In some instances, the builders obtained these promises of funds directly from the final source; in others, the banks continued to act and obtained the commitments for them.

During this period, the banks began to demand fees on construction loans. These fees plus possible servicing fees on the final loan apparently made such transactions profitable, even when premiums on the final loans had disappeared.

During most of 1949, nevertheless, Bay area builders were hampered by the unwillingness of local lenders to make 4 per cent Veterans Administration loans. For this reason, none of the tract houses built carried the more favorable terms that would have been available if the entire loan had been guaranteed by the Veterans Administration. The best terms were obtained by a combination of the Federal Housing Administration loan with a Veterans Administration secondary loan. This allowed almost as low a down-payment as an original Veterans Administration loan, but required nearly a 20 per cent increase in interest payments (table 40).

In contrast with the Bay area situation, in Los Angeles and in most other large metropolitan areas 20 per cent or more of houses in the second half of 1949 were sold on Veterans Administration guaranteed loans. This seems to indicate that in other areas there was somewhat more competition. Mortgage companies and savings and loan associa-

tions were willing to make Veterans Administration loans because they had advance commitments from the government to buy them through the Federal National Mortgage Association. In the Bay area, on the other hand, virtually no loans were sold to the Federal National Mortgage Association. Bay area lenders found that it was not necessary to use this source because as long as they could restrict the market to the higher interest rate loans, all loans offered could be absorbed in the private secondary market.

During the first half of the period, the builder had to pay only for title insurance, appraisal and recording fees, and interest on the money actually advanced. The total cost to the builder was an annual rate of about 7.5 per cent. In 1949, fees or premiums to the lenders became common. Since the money was borrowed for only three months, the effective interest rate was actually 13 per cent per year. In extreme cases, this rate went to 25 per cent per year, amounting to 4.5 per cent of the selling price of the house. Under normal circumstances, all construction-financing costs average between 2 and 3 per cent of the sales price. These figures indicate that though the cost of construction borrowing is high compared with borrowing in many other industries, only in extreme cases does it become a significant factor in the selling price.

Turning from construction loans to permanent loans, one finds that the market for permanent loans is somewhat wider than the market for construction loans. In the six counties of the San Francisco–Oakland metropolitan area, the institutions making permanent house loans can be classified as follows: 32 commercial banks, including 16 national and 16 state, with a total of about 250 offices; 5 state savings banks with 15 offices; 29 savings and loan associations; and 30 life insurance companies, each of which did more than $100,000 in loan business in the area during each year of the postwar period. In addition to these lending institutions, mortgage houses, real estate brokers, and individuals lending their own money may play a role in the permanent financing picture.

Potentially each buyer had nearly 100 different loan sources from which he could select terms for permanent financing; actually, his range of choice was not as broad as might be supposed since the competition among these sources was not great. Only a few differences existed in the interest rate, the amount of down payment, and the

amortization time, and during many parts of the period certain lenders were out of the market, thus further limiting choice.

The permanent loan market differs in degree for four groups of builders. Those feeling most intensely the influence of permanent financing are the operative builders doing a large mass-volume business, who must obtain the commitments for the final loan before they even start to build. Next are operative builders who construct more expensive houses; for them the final financing has not been so critical a factor because the actual terms may be arranged after a prospective buyer appears. Third are contractors for whom the permanent financing is usually arranged before construction starts, with the lender paying as work is put in place. Finally, there are those owners or contractors for whom no loan is required.

Although permanent as well as construction loans on tract houses were restricted to the 12 largest sources previously mentioned as covering most of the merchant-built units in the area, a different picture is found when we consider permanent loans based on houses built by owners, contractors, or the smaller operative builders. Only about one-third of these houses were covered by government-insured or guaranteed loans. Another third were covered by conventional loans. The final third were financed by the owners entirely with their own funds. In 1949, these nontract units accounted for about half the production in the total market, so that the actual share of each kind of financing amounted to approximately one-sixth of the whole market. The scattered-lot market was far less affected by fluctuations in funds available under government guarantees, or by the government's appraisal methods, than was the tract market.

Combining all types of builders and all types of financing, one finds that in the last half of 1949 banks made permanent loans on more than half the houses built. These were almost entirely insured or guaranteed and a large percentage of them was resold in the secondary markets. Savings and loan associations made about 4 per cent of the loans, more than 80 per cent of which were guaranteed or insured. Insurance and mortgage companies accounted for loans on about 30 per cent of the houses, and of these 80 per cent were also insured. Individuals made loans on 2 per cent of the houses, and these were almost entirely uninsured. The final 9 per cent of the houses were bought for cash (table 40).

Role of Local Governments

A description of the factors of supply in housebuilding would not be complete without mention of the part played by local units of government in the issuing of licenses and permits and in the administration of building codes. By issuing building permits, these governmental units supply the right to use the land, and, together with private companies, they furnish the necessary utilities.

The total number of building-permit issuing centers in the Bay area is 52, but the average firm deals with only a few of these centers. Only about 30 firms built in more than three permit centers. In addition to building permits, however, firms frequently require a business license and permit to obtain utilities. If the firm is developing new land, the number of governmental agencies involved increases, since the layout of the site and the type of streets and utilities have to be approved by planning commissions and by the water and sewer districts, and the state has to approve the financial aspects of the subdividing.

With the exception of negotiations over approval for new sites, relations between builders and local government authorities tend to be harmonious and stable. Conflicts over new building sites sometimes arise because there is a divergence of viewpoint among the builders, who are concerned primarily with opening up new building sites at the lowest possible cost, and the planning authorities, whose preoccupation runs more in the direction of aesthetics and future development of the community.

Builders in many parts of the country charge that codes imposed by local authorities are too diverse and too unrelated to the practical requirements of housebuilding. This is not true in the Bay area, though there are 52 code authorities each of which has a separate building, electrical, and plumbing code. The differences between the codes are rather minor, since almost all areas use the same uniform codes, and the number of variations adopted within the uniform codes is very small.

For building code purposes, the Bay area divides into five groups: (1) the bulk of the area, which has adopted by reference the Uniform Building Code of the Pacific Coast Building Officials Conference; (2) San Francisco; (3) four small centers which have not adopted the

Uniform Code and where less than 130 houses were constructed in 1949; (4) a few small cities and towns planned as high-priced suburbs, which have adopted the Uniform Code but with a few significant amendments; and (5) certain parts of the rural nonfarm areas hitherto operating without codes, now in process of adopting the Uniform Code. This means that by far the largest percentage of houses built in the Bay area are built in accordance with the Uniform Code without additional restrictions.

The Uniform Code is revised every three years. But how carefully do areas adopt the latest revisions? Slightly more than a year after the 1949 revision of the code, it was found that 13 centers containing 50 per cent of the housebuilding of the area had adopted the new revision. Twenty-four centers in which about 40 per cent of the houses were constructed were still operating under the 1946 revision, and 9 centers, with about 10 per cent of the building, operated under earlier editions. It might be mentioned that the number of changes affecting housebuilding from revision to revision is not great. In addition, local building officials can and usually will allow use of changes which appear in the new editions even if the municipal ordinance has not been amended.

As with the building codes, all areas have adopted the basic principles of the National Electrical Code by reference, with individual municipal ordinances including some additional restrictions over and above the minimum requirements of the National Code. About one-third of the houses built in 1949 were constructed in areas which had adopted the National Code without amendment; about one-third were constructed in localities which had adopted a slightly more restrictive code in a form known as the Uniform Electrical Code of the Pacific Coast Electrical Bureau. (It is predicted that in the future this code will no longer include any variations from the National Code so far as housing is concerned.) The final third of the houses were constructed in areas which had adopted amendments requiring a marked variation in methods from the National Code, but even in these areas the effect on the cost of the house was not significant.

Somewhat greater variations occur in plumbing codes, though the pattern is similar to the other codes in uniformity of adoption. Again, the city of San Francisco has its own. The entire county of San Mateo and most of its cities, accounting for about 30 per cent of the housing

construction in the area, also have their own. For the past year, committees have been trying to obtain a unified code for the East Bay, which is the largest remaining part of the area. These codes, in relation to housebuilding, are basically similar to the Uniform Plumbing Code of the Western Plumbing Officials Association.

Chapter 9 analyzes the costs imposed by the differences between these areas, and it is found to be slight. The variety and number of local governments may have important indirect effects upon the building industry, but their direct effect is not great.

PART II

7

Evaluating the Efficiency and Performance of Housebuilding

Part I of this study presented a picture of the Bay area housebuilding industry. The structure of the industry and the manner in which it functions were described, together with the problems faced by builders and their methods of meeting them. The remainder of the book evaluates the skill with which housebuilders perform their functions.

Such an evaluation of performance must be based largely on judgment, since neither the available facts nor the criteria of what constitutes good performance are of a nature to supply clear-cut answers. Still some kind of evaluation is necessary for a meaningful explanation of what has already happened to housebuilding, for an understanding of what is currently taking place, and for formulation of future policies if these are to be sound. This study was engineered so that specific data to test hypotheses concerning problems of performance and related policy suggestions could be gathered at the same time that basic descriptive material was being made available.

The chapters which follow contain both the results of these tests and certain conclusions drawn from them. They point to present trends in the industry's development and potential areas for improvement in efficiency. Because the evaluations rest on both judgments and facts, individual readers may, of course, question particular lines of analysis. To aid each one to form his own opinion, the basic information is presented factually in the succeeding chapters, as well as the conclusions from it.

Standards of Performance

The housebuilding industry has been subjected to severe criticism. It has been called a relic of ancient days, untouched by the industrial revolution and still operating in a medieval fashion. As a result, it is claimed, the level of performance attained by builders is far lower than that of any other industry, and houses are so expensive that the simple furnishing of shelter for the population continues to be a crucial economic problem. It is frequently stated that the only means of attaining satisfactory performance in housebuilding is through a rationalization of the entire industry.

Performance in an industry has many dimensions—many more than can be examined in a limited space. Among the most important are those concerned with efficiency, the industry's product, the distribution of its output, the distribution of its income, and its dynamic qualities.[1]

The chapters which follow present the available data concerning performance. In certain cases, these consist primarily of time series based on national averages. In other cases, they are either time series or cross-section data especially collected and compiled for this study. A final group of data is mainly descriptive, with no statistics.

The type of data encountered varies according to the topic under discussion. For example, information on the quality of product—a major area of performance—is purely descriptive. Judgment in this sphere must, on the whole, be subjective, because though some elements of quality are capable of exact measurement, it is not possible to measure precisely the quality of the total unit. There are no absolute standards for design; they vary from person to person, from area to area, and from time to time. At best, one can only report the facts and the opinions of so-called experts, but neither should be accepted as authoritative.

Again, in the realm of progress and technology, it is necessary to inject the element of personal judgment. Performance here depends upon progress shown over a period of time; more specifically, on the rate at which innovations are adopted compared with the number

[1] For a discussion of the problem of measuring industrial performance, see Grebler, *Production of New Housing,* chap. 2; Alfred R. Oxenfeldt, *Industrial Pricing and Market Practices* (New York: Prentice-Hall, 1951), pp. 90–93; Hiram F. Davis, *Industrial Study of Economic Progress* (Philadelphia: Univ. of Pennsylvania Press, 1947), p. 5.

available for adoption and compared with the rate of acceptance of new ideas by other industries. It is possible to measure and describe the way in which technology is changing, but opinions as to whether these changes are adequate must remain primarily personal.

In the field of profits, distribution of product, and opportunities for entry, more information is available. The data describe existing conditions in these fields and also provide a basis for appraising changes over time. But again, present knowledge is insufficient to permit formulation of true standards. Consequently judgments are bound to be subjective and open to argument because of the lack of real standards.

The final area of evaluation—that of changes in efficiency or productivity—is the one which has generally received the most emphasis. It is considered by many to be the most important because, if efficiency is improving rapidly enough, many other problems of performance may gradually dwindle away. An examination of the ways in which performance can be altered may provide a background for fuller discussion of efficiency evaluation.

Determinants of Performance

The actual performance of any industry depends on the movements of many separate and sometimes conflicting forces, each of which often makes several alternative courses of action available. The course adopted in each area separately as well as the interactions of the various decisions determine the final results for the industry as a whole.

Although the number of areas open for action can be classified and subdivided in innumerable ways, economic analysts have fixed upon certain broad categories as most important. These include: (1) the management of firms in the industry, (2) the scale of the enterprise, (3) the structure and influences of the factors used in production, and (4) the over-all organization of the industry.

In attempting to judge performance as a whole, one is concerned with the use made of the potentialities available in each category. Although theoretical concepts have been developed to explain why certain actions occur, their application will vary in all industries and at all times. The unique features of each industry cause it to meet its problems in different ways. An exploration of the determinants of the

level of performance in each of the four main categories, and their effects on the housebuilding industry, may prove revealing.[2]

Management.—The skill, ability, and goals of the owners and managers in any industry are frequently considered to be the most important forces determining its efficiency and good performance. The managements (which in housebuilding are identical with the owners and entrepreneurs) make the day-to-day decisions which shape performance. These decisions—resulting in action or failure to act—cumulatively determine the whole industry's policies and its over-all direction toward progress, stagnation, or retrogression.

In their decisions, the managers are not, of course, free from all restraints. Their choices are limited at least initially by certain elements outside their control, and much of the total performance of the industry depends upon these other factors. Management is presented with particular situations and can only attempt to maximize performance with respect to the variables that it can influence. It is important to observe, however, that factors outside the owners' control in the short run are often amenable to modification over a longer period of time.

Most important of the elements outside management's control is the supply of the labor and materials needed in production. Firms find themselves with a limited range of possibilities as to the type and cost of the factors which can be used in a house. These are given parameters, each of which has a large weight in determining total performance. The firm can choose and substitute among these factors, but at least in the short run its influence on their availability, prices, and basic efficiency is slight.

The next most important outside element in circumscribing management's operations is the available technical knowledge. At any given time the number of production possibilities is limited. Houses can be constructed economically only from a certain group of materials and by particular methods. Again, the firm can choose among these possibilities, but can expand its field of choice only gradually.

These two elements—supply and technology—limit the range of sizes of operation open to the firm. The existing relationships between

[2] For basic statements, see Committee on Price Determination, *Cost Behavior and Price Policy* (New York: National Bureau of Economic Research, 1943); E. A. G. Robinson, *The Structure of Competitive Industry* (New York: Pitman, 1948); and J. Steindl, *Small and Big Business* (Oxford, Basil Blackwell, 1947).

factor prices and technical possibilities (the production function) determine the relative efficiency of particular firm sizes or scales of operations. If the firm wants to produce at the optimum point, it may find itself forced to a particular size of organization.

Finally, there is a whole group of constraints resulting from the industry's (as differentiated from the firm's) over-all organization. This organization is influenced by the builders, the factors of supply, the methods of production, the characteristics of the product, and the market.

Although these limitations on the action of housebuilding firms are important, it is a mistake to believe, as many have done, that they are the main determinants of performance. Housebuilders still have wide latitude for decision, and the available avenues open for action are, on the whole, probably more important than those which are closed.

The choices offered to management may be examined in terms of the various levels of organization at which the managers operate. These many possibilities are shown in figure 8, which presents some of the most obvious ways in which performance can be improved.

The simplest approach is at the house or project level (equivalent to the plant in other industries). This is where production actually takes place. Here the firm can choose among many technical processes available at any given time. It can examine the technical potentialities of various materials, machines, and types of labor in the light of their costs. It can determine the proper proportions or mix of the factors of production so as to give lowest costs. Although this problem is frequently excluded by assumption in theoretical analysis, it is practically one of the most important in the determination of efficiency.

Having decided upon the general method of production to use, the firm can then establish particular systems and production controls to achieve lowest costs. Its methods of operation can determine to what extent the waste of labor, of material, and of other factors will be curtailed. The prices paid for labor and materials may be outside the scope of the firm's management, but the value received and the method of utilization are not. The diagram shows many of the potentialities for cost reduction at the plant or project level which have been important in recent periods.

Above the project or projects, there is another group of functions

FIGURE 8

PATHS TO GREATER EFFICIENCY THROUGH IMPROVED FUNCTIONING OF HOUSEBUILDING FIRMS

I. At project or plant level
- A. Cut waste of materials
- B. Lower supervision and overhead costs
- C. Reduce costs of land and incidentals
- D. Improve use of labor
  1. Reduce movement of men and equipment
  2. Reduce idle time
  3. Diminish reading of blueprints
  4. Increase skill by repetition
  5. Increase tooling
  6. Improve supervision
  7. Set work standards and improve controls
  8. Cut handling of materials and equipment
  9. Reduce turnover

II. At firm level
- A. Better choice of technology
- B. More accurate choice of inputs
- C. Research for improved technology
- D. Design
  1. Better site planning
  2. Reduce size of structure
  3. Reduce variety of plans
  4. Substitute more efficient materials
  5. Rational arrangements of elements
  6. Simplify construction
  7. Increase livability
- E. Lower costs of materials
  1. Cut out distribution channels
  2. Increase bargaining power
  3. Save on freight and handling
  4. Reduce waste
- F. Lower overhead and profit
  1. Spread overhead over more units
  2. Reduce selling costs
  3. Obtain cheaper financing
  4. Reduce profit margin

III. In scale and depth
- A. Obtain optimum scale
  1. Production or technical costs
  2. Selling and purchasing costs
  3. Financing
  4. Management
  5. Risk
- B. Integrate or disintegrate
  1. Materials suppliers
  2. Trade contractors
  3. Other inputs

IV. Change in organization of industry
- A. Change type of market
  1. Amount of competition
  2. Fluctuations in demand
- B. Create coöperative organizations
  1. Research
  2. Marketing
  3. Purchasing
- C. Alter governmental policy
  1. Credit
  2. Codes
  3. Guaranteed market
- D. Change relationships to suppliers
  1. Improved bargaining
  2. Technology

which are commonly spoken of as those at the firm level. Here, again, a wide choice is available to managers. This is the field in which purchases of the direct factors of production are made. The firm is presented with many different ways in which it can arrange for these purchases. Some cost less than others. It is at this level, too, that the builder determines the design of his project. Design influences the production costs, but, perhaps more important, it determines the value of the product he makes. The builder's control over his output may be more important than that over his inputs.

The firm also has more influence than is commonly recognized on the actual technical processes or technology available for use. Most obviously, it has the ability to affect, through research, the state of technical knowledge. Just as important as new research, on the level of performance, is the adoption of the most advanced of already existing knowledge—for example, adoption of machinery already in use in other industries. This path toward greater efficiency is one which builders have been slow to follow. Potential changes in technology have frequently existed for long periods, but because of lack of systems for examining them and of willingness of the builder to experiment, they have been overlooked.

Other vital decisions made at the firm level for housebuilding managements concern overhead structure and use of capital, including such issues as the relationship between fixed and variable costs, the amount of management and executive time purchased, and the ratio of equity to borrowed capital. The judgments on each of these matters will affect costs and the efficiency of the firm. Crucial in this field are price and marketing policies. The management determines the level of performance in these areas by deciding to what class of market its appeal shall be pitched, the type of appeal (either price, advertising, or product differentiation), and the amount to spend on the appeal. It also determines what type of markup and profit level it will seek.

Finally, management has the choice of determining the scope of the firm. Firms are not limited to their present scale, their present depth, or the existing organization of the industry. They can change their scale and obtain any advantage which might accrue to them thereby. They can increase their depth by vertical integration to include more of the building process in their own hands. If housebuilding managements did this, they would then assume the responsibility for the effi-

ciency of certain factors, such as trade contractors' supervision or fabricating of materials, now supplied by others. The builder, by changing his depth, can work with a new set of factor costs and technical possibilities.

Over a period of time, the builder can exert a great deal of influence on the industry's organization as a whole. He can enlarge the functions of his trade associations and assume greater responsibility for the rate of technical change and market knowledge. He may alter the labor structure of the industry through collective bargaining. He may influence the land and capital supply curves by political action. All these are real possibilities for promoting efficiency, and all have actually been attempted in the recent past.

The last two chapters contain an evaluation of the extent to which firms have used the possibilities open to them. In some instances, actual measurements of changes and improvements are possible. In others, all that is found is a potential area of action which has been completely neglected or only now is beginning to be exploited by the most advanced firms. It is from an examination of these facts that trends can be perceived and lines of action for the future can be projected.

Scale.—Among the factors which no housebuilding management can change is the important one of relative efficiency of firms of different size. Builders can pick the particular scale they desire, but related to each size is a certain potential level of efficiency. Although the builder can choose the amount of the factors of production he wishes to use and can also select among various technical possibilities of production, the resultant ratio of output to inputs (or efficiency) shifts in relation to the firm's size. As a corollary, it is evident that some of the changes in efficiency which take place in a dynamic situation are due simply to increases or decreases in scale rather than to any change in the builder's own performance.

The reasons for the changes in efficiency which accompany changes in scale have been detailed many times. In addition to the opportunity for specialization of labor and management which size makes possible, there is the fact that certain indivisibilities exist in the way in which the factors of production can be used and mixed. Consider, for example, what happens in management and overhead. The small builder is tied to his hammer and saw. As a working foreman, he has only his nights and Sundays to devote to off-site and executive functions. The

medium-sized builder, who has laid down his tools, is still swamped with details of supervising construction, doing his own purchasing and subcontracting, keeping his records and accounts. He does not have assistants to attend to routine off-site chores while he streamlines his organization. It requires the added capital and large sales volume of a big builder to afford sufficient off-site assistance to free the manager himself to such an extent that he can explore new paths to efficiency. The result is that many types of management organization are open only to large firms. If these organizations are more efficient, the value received per unit of expenditure for overhead in the large firm will be greater than in the others.

Similar problems arise with all other factors of production. In each case some levels of output are more efficient than others because of indivisibilities. The most efficient scale for the firm (its optimum size) will be at the point where the proportions of all the factors are best—that is, where their total costs are lowest. This, of course, may not coincide with the lowest cost point for any specific factor. The essence of efficiency is that total unit costs be at a minimum, rather than that any single factor be used most economically.

Total unit cost depends upon payments for many kinds of service. Since the cost of each category of service reacts differently to changes in scale, total unit costs may fall either because the costs of all categories are falling or because some categories are falling faster than others are rising.

Economic literature is replete with discussions of the particular cost functions for each factor as well as with assumptions as to the way in which they react to changes in scale. Production or technical costs are the most important and have received the most attention. Since Adam Smith's description of the manner in which production costs fall with specialization and gradual mechanization in the pin industry, it has been common to ascribe a falling cost per unit to the production cost category.

The second major cost category—marketing—is also believed to fall rapidly in relation to growth of size. Methods of buying and selling improve as firms grow larger, bringing about lower costs per unit. Clearly, however, marketing costs cannot continue to fall in relation to unlimited amounts of output. If too many houses are produced in any market, their value will decrease, as will the builder's ability to

sell them. Similarly, if labor and materials purchases take too much of the available supply, each additional unit of the factors of production purchased by the builder must carry a higher price than the previous one. Consequently, after some point, the builder's marketing cost must begin to rise.

Financing, which is the third cost category, could continue to drop in relation to any amount of growth in housing production, since the amount of financing required for housing is only a minor part of the total available. The larger the builder, the wider the financial markets open to him.

The fourth cost category—management—decreases at first with scale, as has been seen, but most theorists believe it would begin to go up again at a fairly early stage of further scale increase because of the increased difficulty of coördination and the complexity of making decisions as the size of facilities grows. This is true also of the fifth cost category, capital cost, which includes the price that must be paid for assumption of risks and losses due to potential economic fluctuations.[8]

The actual cost curve for any firm depends upon the interaction of these five categories. All are changing at different rates and in separate ways. Economists have traditionally held that the cost curves resulting from these separate movements are U-shaped: as size increases, unit costs fall; if size continues to increase, unit costs will start to rise at some point.

In addition to these effects of scale, observable among firms of various sizes in a static situation, certain other advantages might arise with growth of size in a dynamic situation. In the real world, management's influence on technology and the general organization of the industry increases with size. It is, therefore, possible—though not inevitable—that larger scale could bring about further reductions in costs through changes in the production function and in factor prices.

Factors of Supply.—The vital part in housebuilding performance played by the factors of supply has already been discussed. From 80 to 90 per cent of the total cost of a house is spent for the direct costs of construction. The total cost of these factors will be influenced by the management's efficiency in purchasing and combining them, but it can also change independently.

[8] Cf. Robinson, *op. cit.,* and Committee on Price Determination, *op. cit.;* for a fuller explanation of these points.

The housebuilder's own position is such that he cannot change basic prices of supplies and labor. At the most, he can change the total expenditure by substituting one factor for another or by altering the proportions within a given element. For example, he may reduce his labor bill by making use of unskilled in place of skilled labor, but he usually cannot change the basic price he has to pay the skilled or unskilled men. These prices are determined by the impact of all builders together and of the entire economy.

Although the builder's influence on the cost of the factors of production is minor, the effect exerted by these factors on the total performance of the housebuilding industry is great. In addition to setting up the basic frame within which prices of houses are established, the supply industries are important determinants of technology and the organization of the industry itself.

The extensive changes that have occurred in the prices of the factors of production in recent years have already been discussed. In any period, changes in these prices are likely to outweigh all other cost factors.

In technology, though housebuilders themselves have done practically no research, the supplying industries have. A large share of new technical processes, new methods, materials, and machines have entered the house because of progress in the supplying industries. Examples include the recent development of simple power tools, of transit-mix concrete, of effective dry walls. Even more progress along these lines appears possible.

In the general organization of the industry, the factors of supply form an important part and affect the builder's ability to change the shape of the industry as a whole as well as that of his own firm. It was observed that when a builder expands his firm in depth he assumes some of the functions of the existing suppliers. The suppliers may acquiesce in such changes, or they may obstruct changes until the builder will not even attempt them. Some changes in organization require approval of financing institutions, labor unions, or of the government. Any of these may raise objections, or, as has happened in the postwar period, some of the most important impetus toward change may arise in these fields. Chapter 9 will discuss some of the main constraints imposed upon builders from these sources as well as their effects on general performance.

Organization.—The over-all organization of the housebuilding industry, which is the final determinant of its performance to be considered here, is the result of the interplay of many forces. The groups which control factors of production and those which implement public policy, as well as market conditions, the type of product, production methods, and the historical development of the industry, all add their weight to the individual decisions of housebuilders to determine what the organization of the housebuilding industry shall be.

The market for housing is competitive, varied, local, and fluctuating. The industry is fragmented into thousands of firms, none controlling an important share of the national market. Even in local areas there are few dominant firms. Entry is simple. The industry is subject in almost all areas to potentially fierce competition, though during the postwar period, because of the tremendous increase in demand, competition was for the most part moderate.

Housebuilders' associations have had little effect on competition or other aspects of market conditions. Large- and medium-sized firms, joined by some small ones, have only recently united in local and national organizations. The purpose of such groups is primarily to exchange information, publicize the industry, and exert political pressure. They have made rapid progress, but are still in an embryonic stage compared with many other industrial associations.

The local nature of the demand for houses is, of course, a dominating characteristic of the market. Houses are sold on a local basis. Every market has unique tastes and idiosyncracies. Consequently, intimate knowledge of local conditions is required for success. In addition, because demand for housebuilding has experienced fluctuations that rank among the sharpest known to our economy, great flexibility is also a requisite for success in the field.

In addition to the market, the nature of the product is, of course, a major determinant of housebuilding performance. The house is bulky and complex, with a great multiplicity of parts and materials. It is durable and is produced in great variety, with every house differing from every other in some way.

A further factor influencing the industry's structure is its production technique. Traditionally, housebuilding has been a combination of fabrication and assembly. In recent years, builders are becoming to a greater extent assemblers. Since assembling is done with a minimum of

equipment, this trend works to decrease the maximum size of firm necessary to produce houses.

The historical background of the industry also plays a part in its present-day structure and performance. Housebuilding is one of the three or four oldest occupations. Houses very similar to modern ones have been constructed and lived in since ancient times. The long and slow development of man's ideas about proper shelter obviously affects his ideas of shelter today. This is also true of construction methods. Present materials and methods have been tested through a long period of time. Although this fact does not preclude the introduction of radical innovations—the transportation industry proves the opposite—it does mean that technical progress, unless of a revolutionary type, is likely to be slower because knowledge of various possibilities has existed for many years and much time has already been spent on improvements.[4]

Another important historical factor is the background of most of the entrepreneurs in the housebuilding industry. The fact that the majority of builders were formerly mechanics or craftsmen who have grown out of that class has an important effect on their planning and methods of operation. Professor F. H. Knight's suggestion that the relation between efficiency and size of firm is largely a matter of personality or historical accident rather than of intelligible general principles is illuminated by many of the traits noticed in housebuilding firm managements.[5]

Apart from historical considerations, in today's economy the factor of capital requirements has a telling effect on the form of the housebuilding industry. Clearly, a different type of industrial structure will develop when a successful firm may be established with from $1,000 to $2,000 capital, as in housebuilding, rather than $100,000,000 or more as required in an industry like automobiles. The amount of capital required to enter an industry is determined by the amount of plant and equipment needed for production as well as by the need for working capital and the methods of financing common to the industry. The amount necessary to meet each of these requirements tends to be minimized in housebuilding.

The forces that have been cited affect performance directly in many cases. The market influences the level of profits and prices. By requir-

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[4] Davis, *op. cit.,* p. 40.

[5] Cf. Committee on Price Determination, *op. cit.,* p. 228.

ing flexibility, it exerts large pressures on the way in which firms organize. It also controls the rate of entry. These things, in turn, affect technology, methods of marketing, and distribution of the product. But the market should not be considered as the only influence.

Many forces affecting performance have frequently been ignored, and performance left to market determination alone, since the builder has not been equipped to deal with the other elements or has not considered them important. Such neglect is not, however, necessary. When problems are too big for an individual builder, they could be approached through the combined efforts of many builders or through public policy. Recently, certain attempts have been made to influence performance along these lines. Examples may be found in the use of government research to improve technology and in the use of the Federal Housing Administration and the Veterans Administration to widen the market. Other possibilities, such as joint-selling campaigns and attempts to reduce demand fluctuations, will be considered later.

The organization of the industry is a fixed structure only in short-run terms. In the long run, it is subject to the influence of individual builders, their associations, associations of the supply factors, and the public. Throughout a discussion of performance, it should be kept in mind that potential action might come through any or all of these channels.

Measurement of Efficiency

Based on the background of the preceding examination of the determinants of performance, a more detailed exposition of the measurement of efficiency may be offered.

Because of the great interest in the measurement of efficiency, much effort was expended in this study on devising methods of measuring it. Since the difficulties which were encountered, as well as the ways in which they were surmounted and the reasons for arriving at the final method, have strong bearing on the analysis in succeeding chapters, these problems receive a fuller discussion than has been given to the other measures.

In theory, efficiency is relatively simple. It is measured by the ratio of real output to real input, but the problem is complicated by the fact that there are so many determinants of the level of efficiency. For some purposes it may be enough to know simply that efficiency has changed, but for most, some measurement of the effect of the different forces is

desired. For instance, the changes in efficiency over the past ten years might be due to opposing movements in the performance of management and of the factors of supply. In this case, one could arrive at two quite different understandings of the situation depending on whether one proceeded from knowledge of the amount of each separate movement or from knowledge of their aggregate results alone.

Unfortunately, the ideal measurements are simply not possible at the present time. There are no available statistics showing how total housebuilding efficiency has changed, let alone data on the individual components. Furthermore, even measurement of the level of efficiency now existing is difficult. Such a measurement requires a scale or standard. Yet, since every industry has its own particular background, product, organization, and market, such standards vary from one industry to another. Comparisons are frequently made with another industry or with a list of suggested improvements, but such comparisons may be invalid because no one knows whether or not a technique is applicable until it has been tried. The history of the past twenty years is littered with suggestions for improvements in housebuilding, most of which were not usable. People thought they knew exactly what ailed building, but their ideas were often based on too little knowledge or on false analogies. Interindustry comparisons contain many such fallacies. For these reasons, even with data collected especially for the purpose, quantitative measurements are limited in their scope.

The ensuing discussion will present facts which may be more pertinent. In the first place, the estimate of the effect of scale on efficiency is based upon a cross-section analysis of existing firms of different sizes. Since it is known that larger-sized firms have developed only in the recent past, this estimate also measures the effect of the growth of such firms. On a more speculative basis, it gives some of the facts necessary for an analysis of possible future trends in scale.

In the second place, measurements of some of the influences on efficiency exerted by the factors of production outside the firm are based on results of the known inefficiencies and constraints in these factors. These measurements provide estimates of potential changes, as well.

In the third place, estimates of the performance of management in housebuilding are based either upon a comparison of the average with the best now active, or upon a set of subjective standards which have struck the main observers of the industry as applicable.

The combination of the various types of measurement and evaluation gives more workable knowledge than was previously available of the significance of changes that have already taken place as well as of the major problems facing the industry in the future.

In combining types of measurement, this study gave heed to the great amount of discussion in the past as to how changes in efficiency could be evaluated. To obtain a valid measurement, it is necessary to have a series showing the changes in outputs and inputs either over periods of time, or among firms of various scales, or among firms facing particular external problems, depending on which of these influences is to be separated out and measured. Special problems were faced in devising a pragmatic scheme of measuring housebuilding efficiency.

As to inputs, the productive resources used by a housebuilding firm are varied. First come those required to perform the overhead or indirect functions of the firm. These include the management and executive staffs with a small group of salaried assistants, the capital investments, a very small amount of equipment and real property, and the sales staff. In the next group of resources is the direct labor hired by the firms. Finally come all the purchases made by builders, including their materials, subcontractors, financing, and other incidentals. Some basis for judgment of efficiency might be obtained by calculating the ratio of each of these specific inputs to outputs measured in physical terms. For example, some industries measure output per man-hour or output per unit of equipment and speak of the changes in these ratios as measurements of efficiency. This simplified procedure is far from satisfactory, however. In building it would have little value, because no factor is paramount in the production of the house. A change in the ratio of a particular input might always be offset by changes in other factors. In addition, it is difficult to obtain measurements for many of these inputs in physical units.

For these reasons, it appears necessary in measuring building's efficiency to aggregate all input in dollar terms and to compute changes in the total dollar value of input. To be of value, each input must obviously be expressed in dollars of a constant value before aggregation; otherwise the comparison might simply reflect changes in prices and profits instead of efficiency.[6]

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[6] This is the method approved by the primary experts in this field. Cf. Davis, *op. cit.*, p. 25; Committee on Price Determination, *op. cit.*, p. 154.

Still more difficult problems arise in the measurement of output. Houses are usually measured in units, or occasionally in units of a certain average price, but everyone knows that houses can vary greatly in their size, design, and workmanship. As a result, either of these measurements is extremely inaccurate. The output which is used in finding efficiency ratios must represent a fixed bundle of utilities, or the measurement makes little sense. This difficulty of stabilizing the measurement of output is, of course, not unique in housebuilding.[7]

Other obstacles occur in attempts to measure efficiency. The number of variables in the production process is endless. Ideally, we should observe production in controlled experiments in order to gauge the manner by which the ratio of output to input changes with each variable. This is the method of the laboratory. It is remotely possible, at great expense, to duplicate such conditions in the building field, and such experiments have potential value.

Such experiments were not, however, possible for this study because of their great cost, and also because the setting up of the experiment actually might have had more influence upon the variables being examined than any changes observed in the process of the work. For these reasons, and others, we found it necessary to base our measurements upon accounting records in the actual field, rather than on any test-tube situation.

Turning to the actual accounting records of firms, there were again several potential approaches and even greater difficulties. The entire housebuilding industry in the postwar period has been in a state of turmoil. Firms have been growing rapidly, and their methods of production have been undergoing constant change. The prices paid for factors were fluctuating almost every day.

It was possible to obtain some aggregate figures for changes in the costs of a firm over a period of time, and also some figures which would have allowed comparisons of the costs of many firms at the same time. What, however, would have been the value of either of these measurements?

Changes were so rapid that it would have been impossible to isolate any of the variables under consideration. An example was the problem

[7] Davis, for example, states: "In the study of productive efficiency it may be that for practical purposes one needs to be more concerned about the inaccurate measurements of output than about the complete measurement of input." *Op. cit.*, p. 35.

of material purchases. Five firms, each building houses in the same period, all paid different amounts for their materials. To what factor should these cost differentials have been ascribed? Part of the difference was obviously due to changes in scale, or to the differences in the amounts purchased by a firm in a given period. A part arose from the fact that though the period covered was the same, materials prices changed daily and even hourly. Thus unless the firms were all buying at the same moment from equally well-informed sellers, part of the variations were simply due to differences in time. Other variations resulted from the fact that the products actually received by the firms were not identical. They varied in grade and in the services furnished. Finally, some firms paid less because they had better or more efficient managements, able to shop more effectively in the existing market. These problems are typical of those which arise in an attempt to compare prices actually paid. They could not be resolved because of the imperfect knowledge existing in most of the housebuilding materials market.

Similar difficulties exist, of course, in measurement of output. Although a firm may have built nearly the same house from period to period, there was no way of isolating the effects of whatever changes were introduced. This was also true of comparisons among firms. No two housebuilding firms ever build the identical product.

In seeking to solve the foregoing difficulties, we arrived at the device of measuring the effects of changes upon the costs of a composite house which any firm might have built. We developed a synthetic cost curve drawn from many accounting sources rather than a cost curve based upon an attempt to rectify the figures of a single firm. This composite house index or synthetic cost curve serves two purposes: (1) It provides a method of weighting all the various elements that go into the house so that each appears in its proper perspective, and (2) it results in a comparison of over-all costs and efficiency.

The procedure used in developing this index was to obtain for large, medium, and small builders average prices paid for each basic element of a typical house. Actually about 100 different elements of direct and indirect costs were priced separately. Prices for each element were obtained from enough sources so that the resulting average price for each class of builder was thought to be accurate. (See Appendix H for a complete description of the method used.)

The plans for the structure used in obtaining these prices are shown in figure 9. It was designed with the typical characteristics of a Bay area house. It is completely undistinguished in design and character. On the other hand, it is typical. It meets the FHA minimum construction requirements. It is of median size. It is of minimum quality. No one would be surprised to come upon this house anywhere in the area.

The plans for the house, the list of materials required, and the quantities and specifications for each subcontract were taken into the field where prices were obtained for each element. The labor costs and incidentals were taken from the builders' records, corrected as necessary to account for differences in specifications. The materials and subcontract prices were derived from those reported by dealers and trade contractors. Since these men actually sell materials or bid for jobs with various types of builders each day, it was assumed that their knowledge of the discounts and other savings available to various-sized builders was more accurate than that of builders who enter the market only periodically and then are not certain whether they are obtaining the best possible deal.

The profit and overhead figures were also taken from actual operating statements as described in previous chapters. We have used typical figures rather than following the common practice of assigning an arbitrary value for these components. In fact, the only cost not based upon a survey is that for land. (The reason for using a single figure for this item for all builders is explained later.)

The prices or costs of every element to each class of builder were averaged separately. These element prices were then added together to give the total amount an average builder of each size would have had to pay in building this same structure (fig. 10). Since average operating margins were added to the builder's direct cost, the index shows the total price each size of builder charged for his product as well as the costs for each major expense in the house.

The cost curves are synthetic because they are derived from many separate sources. In addition, they apply to an imaginary house, rather than a real one. The composite house is simply a method of assigning weights to each factor in the building process so that over-all comparisons can be made. It is believed to be a representative index. Inherent in it are all the problems familiarly encountered in the use of index numbers. But it does, we believe, serve its purpose. It demonstrates

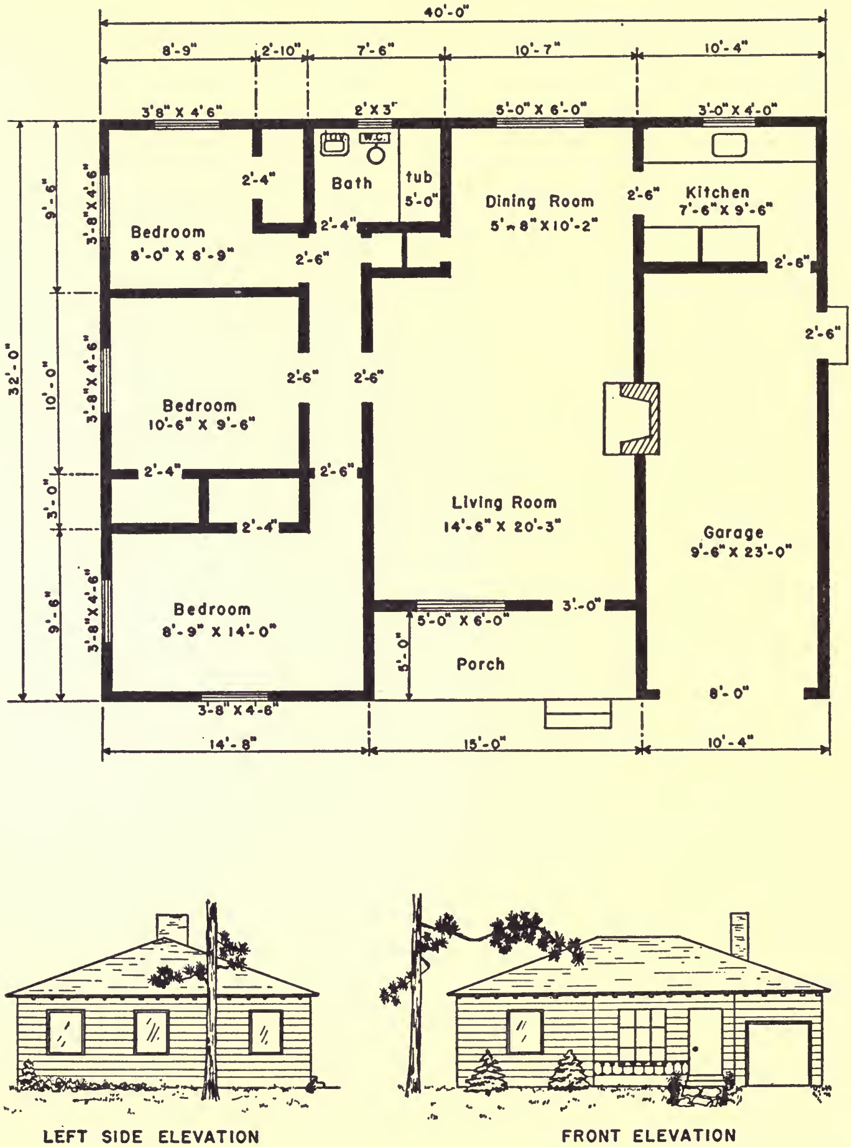

Fig. 9. Plan and elevation of the composite house.

the relative costs for materials, subcontracts, and labor to average builders of each class. It also shows the relative importance of each element of cost in typical Bay area construction.

Through its use, variations in efficiency accompanying changes in size can be measured directly through comparison of the cost of each specific input and through comparison of the price that would have been charged for the composite house by the average firm of each size. Its data also make possible measurement of the importance of any supply restrictions. This can be done by relating a restriction's effect upon the factor's own cost to the total cost for the typical house. In this way the supply restriction's relative weight can be found. Finally, though the index does not measure internal efficiency, these data make it possible to judge the relative importance of particular problems facing a firm's own management. Thus the index may prove of use to a study of the industry as a whole or to an examination of practical issues confronting an individual firm.

The dangers of this approach are obviously great. Many of the men in the industry who aided us with cost data voiced skepticism as to whether there were such things as typical or average prices or conditions. They felt that the individual circumstances surrounding each price were such as to invalidate comparisons. On the other hand, as we continued to amass our research data, we found that costs tended to cluster, to form definite distributions, and therefore averages appear to show a true picture of the underlying relationships.

Certain important qualifications of this analysis must naturally be made. The index is for an average builder of each size and therefore might apply only partly to any real firm. Depending on the know-how and ability of the particular owner, production methods used varied greatly. The range in production efficiency due entirely to the skill of management at any level of output appeared to be as high as 50 per cent. This meant that comparisons of the most to the least efficient builder at any level, or between levels, might show so great a difference. In measuring the effect of size on efficiency, the management skill factor was held constant by using the builder of average efficiency at each level.

The actual practices employed by any firm also depend upon the conditions of supply and demand in the markets for materials and labor. Cost-saving devices which are possible when ample supplies are

available may be discarded during other periods in favor of costlier methods which seem to insure a more certain flow of materials. Channels of materials distribution described in this study were those available immediately before the Korean war, from July, 1949 to June, 1950, when, on the whole, the greater part of materials and labor were in adequate supply and the most efficient channels for materials purchases could be employed.

It is possible that the use of the composite house as an index may raise the question that since no firm has necessarily constructed a unit identical with it, its concreteness is illusory. This is not important. Every builder has purchased most of the items included in it. Each has entered into subcontracts calling for approximately the same amount and quality of work by each type of trade contractor as required for this house. All have hired labor to build units of about the same size. The pricing of fixed quantities and specifications allows comparisons.

8

How Efficiency Grows with Size

Effect of Scale on Costs

Differences in costs due to size of operation reflect the effect of scale on the level of efficiency. The extent to which costs vary with scale can be measured by the composite house price data. These show the actual expenditures by builders of each size group at the start of 1951 for all of the main building components, as well as the prices at which they would sell the house. A comparison among the columns of figure 10, giving the specific amounts, shows how costs change with size. (See Appendix H for a description of the method of compiling the index.)

Increased size has led to decided savings for builders in purchasing, financing, and the production process. It is true that most of these savings have been offset by higher payments to the owners and managers of large firms, so that, to date, only about 8 per cent of the reductions in direct costs have been passed on to the ultimate consumer.

This composite house index may, however, understate the real growth of efficiency which has occurred with size. The indirect costs shown for large firms may well be excessive and peculiar to the period under study because of a lack of competition. In addition, certain factors such as design and land, which increase the advantages of large firms, are omitted from the index.

There are clear indications that the total margin charged by large firms over direct costs was abnormally high during the period studied. Demand was so strong, and competition, therefore, so weak, that the large builder's margin could rise to engross most of the difference between his costs and those of the small builder. In a noncompetitive situation, increased efficiency led to greater profits instead of to lower prices—a result that would be predicted in normal economic analyses. This special situation may have distorted the true picture of efficiency in relation to scale.

The omission of exact estimates for design and land must also be considered in evaluating costs and efficiency. The cost figures show the amount of money required to produce an identical house by firms in each size group—a situation which, of course, did not occur in reality. In 1949 the median house sold by small builders was priced at $12,400; by medium-sized builders at $10,500; and by large builders,

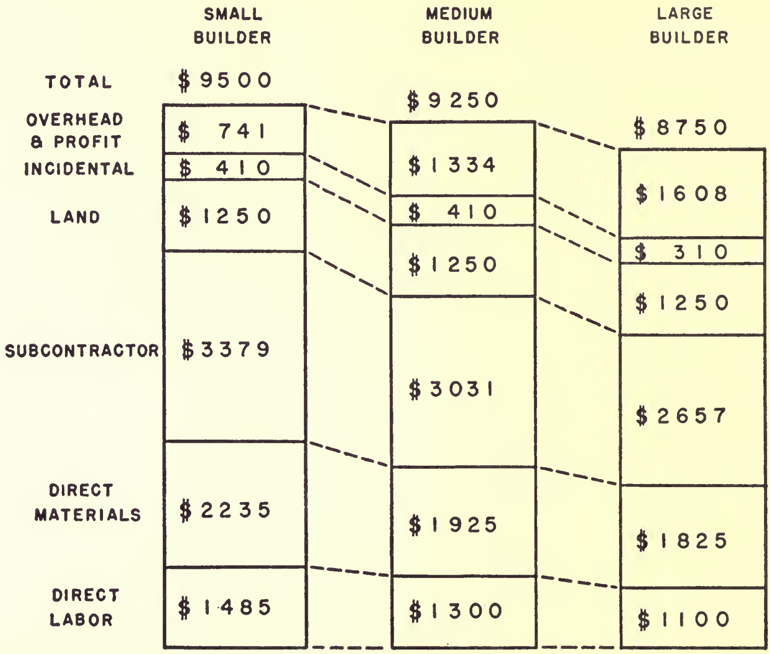

Fig. 10. Major payments for the composite house, by size of builder. Source: Tables 49–52.

at $9,250. These figures, which refer to houses actually constructed, reflect great differences in the design of the units and in their land costs, factors excluded from the composite house index. Differences in design can cause much greater variety in average costs to builders of each size than do changes in the efficiency of producing like units (table 39).

Good design is one of the main factors affecting true efficiency. Within the various limits imposed by codes, planning commissions, banks, Federal Housing Administration, and by the paramount requirement of salability, a builder erecting houses for sale and not on

contract can plan the structure as he desires. He is able to plan so that building costs are reduced to a minimum. Although this statement applies to both large and small builders, it is more important in larger operations, since the greater the number of units constructed, the greater is the total potential saving obtained through better planning and the more funds are available for spending on it.

The following methods of reducing costs through proper design have frequently been publicized:

(1) The large-scale merchant builder can save costs on land, improvements, and house construction by correctly gearing the size and location of lots and the type and amount of improvements to the nature of the prospective house. He may also improve its salability thereby.

(2) The builder can reduce the cost of materials by decreasing the total size of the house; by keeping the types and quality of materials to a minimum (e.g., all millwork may be of the simplest type); and by cutting down waste in making certain that no studs, joists, and the like, are unnecessarily duplicated, and that the unused scrap is minimized. When new, cheaper, or more efficient materials are discovered, they are included in the plan.

(3) Additional features can be incorporated which reduce both materials and labor, as, for example, the use of slab floors with asphalt tile in place of the more conventional foundation and hardwood floor, and the use of an exposed beam ceiling-roof combination ("single roof").

(4) The house can be designed to simplify construction and save as much labor as possible through the simple repetition of a basic design and the use of standard items.

(5) Finally, the amount of value in a given quantity of materials and labor can be augmented. This is familiarly known as increasing the livability. Through better design, the buyer may receive more for his money. Conversely, if the design calls for poorer quality, he may find himself with greatly increased maintenance costs and with less actual value.

Although good design can obviously reduce costs in several directions, no attempt has been made in the composite house index to express the potential savings in dollar terms. It is probably not valid to compare the designs evolved by small builders with those of large builders because each may be constrained by market considerations.

Builders of large numbers of units tend to produce "minimum" houses for a low-priced field, whereas builders of small numbers of units typically produce a more expensive and less standardized dwelling.

The small builder typically builds a custom house in the more expensive areas. The buyer of this house pays for location, greater space, a large amount of finish work, and other custom details. The medium-sized builder comes much closer to building the composite house, though it may be on more expensive land than would be considered typical.

The large builder, on the other hand, is likely (or was, during the period of this study) to build a unit that has many more cost-saving features than the composite house we have used. The composite house has hardwood floors, a fireplace, and a redwood-siding exterior; the house built by the large builder may have a slab floor, no fireplace, and may use stucco. All these features will lower the cost of the unit. Other materials—for example, millwork and cabinets—are also produced at low prices especially for the tract home. These, too, will reduce comparative costs, though they will not necessarily improve efficiency.

The kind of land used by different types of builders is, like design, a major cause of variations in actual prices, reflecting differences in value rather than in efficiency. Although a few of the big builders specialize in expensive homes on high-cost land, most of them are likely to build on less expensive land than that used by other classes. The average house of the large builder is usually on a smaller lot, in a tract, and probably has less value.

Our study shows that there is likely to be but little relation between the type of land used by operative builders and by single-house builders. Each concentrates in his own area. In addition, in tract developments the financial arrangements for the preparation of the land are likely to be done in a special way each time, and the manner of raising funds and allocating possible cost savings will vary from job to job.

Small builders' costs reflect large differences in land prices depending upon the area in which they are active. The medium and large builders' land costs are usually arbitrary, expressing only an internal accounting decision by the development company as to what price the building firm should be charged. Land can be a profitable source of income, and in certain instances the profit on this item may be more

than that on building. For these reasons, we have not attempted to price land for our composite house.

Other profits similar to those on land may accrue to the large builder, but likewise are not reflected in the costs of the composite house. Most important has been his ability to capitalize on the movement of population into an area by building a shopping center. Such a venture is almost always handled separately so that the bulk of eventual profits can be shown as a capital gain with consequent tax advantages. The large builder can capitalize on this possibility, but it is not available to the small one.

Along the same line is the chance for profits on originating a large volume of loans. The index shows somewhat lower financial charges for the large builder. However, during periods when government-insured loans have sold at a premium, the big builder has made additional profits as an agent arranging the final mortgage loans. Similar possibilities for profits also exist in selling insurance and in brokers' fees paid for resale of houses.

These other sources of income have at times been so large that builders enjoying them would have been willing to operate their actual construction enterprises without any profit. None of them, in practice, felt called upon to go to this length, but the possibility of such a development points up the fact that large scale engenders certain savings and profits not measured by the composite house index. It also indicates that in a more competitive situation the charges for profit and overhead attributed to construction in the large-scale operation might be greatly reduced.

Effect of Size on Direct Cost Categories

The theoretical basis for changes in costs as size of operations increases has received ample attention from economists. Labor costs fall when workers repeat the same task rather than perform a variety of operations; when less time is lost in moving from task to task; when the amount of mechanization is increased; and finally, when scheduling and supervision are thoroughly organized. The cost of materials and subcontracts is reduced by institution of more economical purchasing methods. As operations grow in size, quantity purchases become feasible and the buyer can drive a harder bargain. Through better planning and scheduling, the cost of financing may be reduced.

Figure 10 showed that direct costs—labor, materials, subcontracts, and incidentals—in the composite house index amounted to $7,509 for the small builder, $6,666 for the medium builder, and $5,892 for the large. In other words, these costs fell by $843, or approximately 11 per cent, with the first increase in scale and by an additional $774, or about 10 per cent, with the next increase. Those who built at a rate of more than 100 units per year averaged approximately 21 per cent less in direct costs than did the builders whose rate was less than 25 units per year.

Examination of each of these cost components in turn will show how its cost changes with scale, the reasons for such changes, and some of the problems encountered in measuring these variations.

Direct Labor Costs.—The average small builder paid out $1,485 to his own crews to construct the typical house. The operational problems of the small builder have been described so frequently that they form for most people a stereotype of the building industry. There is little specialization. Each man must be a craftsman able to perform all tasks. Most pieces of lumber must be cut to fit, the process consisting of finding a piece of lumber, carrying it to its destination, measuring it, sawing it, and then hammering it into place. Much time is lost in movement, in measurement, in picking up and laying down tools, and in the change of tempo as a worker goes from one task to another, never getting into the swing of a process. Very little mechanized equipment is used, partly because it is not worth carrying the overhead of expensive tools which will only be used occasionally, but mostly because a power tool requires more time to move and set up than a hand tool, and does not pay unless it can be used steadily for several operations. Finally, since every job is different, it is impossible to set good work standards. The work accomplished is checked by a visual inspection to ascertain whether the carpenter is "putting out" or not.

This stereotyped picture is somewhat overdrawn. The composite builder of single houses in the Bay area, from whom the $1,485 figure is taken, had as minimum mechanized equipment a hand-power radial saw which he used to trim the subfloor, sheathing, and siding and possibly to cut studs. In many cases, he also employed a large power saw to cut studs, blocking, bridging, and the like. He recognized the need to minimize materials-handling and waste, and he attempted to

save carpenters' time by having the laborer carry as much material as possible close to its point of use.

As the size of operations increased, more efficient methods were adopted. Medium-sized firms divided their men into several crews, each of which worked on only one part of the house. By the time the rate reached one house a day, there were as many as ten crews with work quite specialized, each crew gaining greater proficiency at its particular task. Since all the houses were similar, a worker continually repeated the same task, building up his skill and speed and developing a rhythm and tempo which increased output and thereby lowered the costs. In place of blueprint reading and laborious measurements, templates and patterns were used. Mechanization was increased.

Such a reorganization of their technological methods and the functions of their labor force resulted in a saving for the average medium-sized builders of slightly more than 12 per cent, or $185, of the $1,485 the small builder spent on direct labor. For the average large builder, the saving in labor cost amounted to $385, or 26 per cent, which is about one-quarter of his total savings resulting from scale. This saving was made without any appreciable difference in unit costs of equipment or supervision.

Such advantages cease after size has increased to 500 units a year. Experience indicates that when the volume of construction of the most efficient large firms grows beyond the level of one to two houses per day, few, if any, further savings can be realized through labor specialization. Most efficient firms of this volume are already operating in an area where labor costs may rise rather than fall as operations increase. Exact costs depend upon particular conditions in the labor market. When labor is tight, any expansion in the size of large firms means hiring additional personnel who are less efficient and cause greater turnover.

Beyond this, with increased size, costs of supervision rise slightly, whereas few offsetting advantages result from better available techniques or increased mechanization. In fact, firms moving within the range of one to 20 houses per day have experienced practically no change in the type and amount of equipment used or in the production process. Most firms find that four to five men for any particular operation are about the maximum, and that by the time production

is one unit per day, they have divided the construction process into about as many operations as practicable. This means that, considering only the builder's direct labor, the most effective amount of specialization is reached when there are between 50 and 100 men on the project. After this point, the same organization is simply repeated as many times as necessary to reach any desired level of output. Approaching their minimum when volume is near one house per day, labor costs stay at this low level for larger outputs as long as an adequate labor supply is available.

Changes in methods and costs of materials distribution.—It has been pointed out that as the builder increases the size of his organization, he also changes the methods and channels through which he buys materials. The small builder buys his supplies almost exclusively from retail lumber yards. The medium-sized builder uses both retail and wholesale channels, whereas the large builder purchases almost entirely from mills or wholesalers. Basically, similar changes occur when trade contractors purchase for jobs of various magnitudes.

What effect do changes in purchasing methods have on prices? Survey data showed that costs fell rapidly as the size of purchases grew, primarily because the services required by the builder progressively diminished. The actual decreases in costs are shown in figure 11.

In brief, the figure shows that for the typical Bay area house, the average small builder spent $2,235 on items purchased directly—mainly lumber, millwork and cabinets, wallboard, and both rough and finish hardware. On these items the large builder was able to save $410, or 18 per cent. This same percentage, amounting to a total of $669, was saved on all the 15 major materials in the typical house, including those bought by trade contractors. The total amounted to $3,759 in the house constructed by the small builder (table 51).

The source of these materials-cost reductions is found in the four basic factors leading to greater efficiency and lower costs with increased size—namely, reduced wastage, bulk handling, simplified distribution channels, and increased bargaining power. The following discussion presents the reason why materials prices to builders and trade contractors fall with size, with examples of the most important changes which occur in individual materials.

(1) The simplest cost reductions are based on less wastage. When several houses are built at one time, bits and pieces left over from one

frequently can be used on the next. This is the basic reason for the indicated savings on concrete and paint between the small- and medium-sized job. Concrete is furnished in fixed units. When a single house is built, if all is not used, the balance is wasted. When two houses

FIGURE 11

COSTS OF BUILDING THE COMPOSITE HOUSE BY BUILDERS OF DIFFERENT SIZES

Component	Size of builder			Size of builder		
	Small	Medium	Large	Small	Medium	Large
	(In dollars)			(In per cent)		
Labor						
Direct	1,485	1,300	1,100	16	14	13
Trade contractors	1,161	1,010	944	12	11	11
Subtotal	2,646	2,310	2,044	28	25	24
Materials						
Direct	2,235	1,925	1,825	24	21	21
Trade contractors	1,524	1,427	1,265	16	16	14
Subtotal	3,759	3,352	3,090	40	37	35
Trade contractors' overhead and profit	694	594	448	7	6	5
Builders' overhead and profit	741	1,334	1,608	8	14	18
Land	1,250	1,250	1,250	13	14	14
Financing and incidentals	410	410	310	4	4	4
Total	9,500	9,250	8,750	100	100	100
Subtotals						
Subcontracts	3,379	3,031	2,657	35	33	30
Direct costs[a]	7,509	6,666	5,892	79	72	68

[a] Includes labor, materials, subcontracts, and incidentals.
SOURCE: Tables 49–52.

are poured one after the other, as occurs in a tract, this wastage is eliminated and costs are reduced. Similarly, small amounts of paint are not wasted when the same color is used again and again.

(2) More important are the savings made in bulk or quantity purchases. Most familiar and significant of these is the price differentiation between carload (C.L.) lots and less than carload (L.C.L.). Somewhat

similar are discounts that depend on the method of packaging. Prices differ between standard packages and broken lots and between units sold in drums and in cans. Finally, discounts may apply to the amount purchased on a given bill or according to volume during a given period.

An example of the savings to be realized through quantity handling was found in roofing. Roofers could buy in four different quantities and pay four different prices for the same product. Bay area dealers in roofing products quoted the following types of price differentials to all dealers and trade contractors. The basic price was that for deliveries of more than 1,000 pounds to the building site or to retail dealers. If the order was for less than 1,000 pounds, this price was increased by a cartage charge of $2.50. On the other hand, if the order was for a full carload spotted at the tract, yard, or wherever the builder chose, the basic price would be reduced by 16.5 per cent. The builder was then responsible for unloading the car and moving the material to the site, so that his actual savings on quantity purchases would run from 12 to 14 per cent. The fourth price was intermediate. If the builder wanted to pick up his order at the warehouse, he would pay 5 per cent less than the price delivered at the site. Savings in this case would depend on the quantity involved and on his own handling costs. (Based on the survey for Appendix H.)

The carload savings for plumbing and heating equipment, for asphalt tile and linoleum, and also for ceramic tile follow a similar pattern and are of the same magnitude. Other items such as paint, electrical supplies, paper, mastics, and so on usually were not purchased in carloads, but reductions were available for buying standard packages, pallets, or drums. In these cases, the standard package reduction was about equivalent to the difference in L.C.L. and carload prices just described for the more bulky items. Some carried an additional discount based on the total size of a given order.

An illustration of the standard package saving is found in the electrical field, where discounts on either wire or standard items such as outlets and fuse boxes were based on standard packages and on volume of the total order. For instance, the price of No. 12 "Romex" type nonmetallic cable when sold in cut coils of less than 500 feet was $73; if 11 or more coils were purchased, the price would be $55. Similarly, a common piece of electrical equipment packed 10 units

per carton and 50 cartons per standard package cost 40 cents per unit when bought in less than carton lots, 35 cents if bought in cartons, and 30½ cents if bought in standard packages. The saving through purchasing standard packages rather than cartons was 13 per cent. Approximately 40 houses could be equipped from a single standard package.

In certain cases, discounts based on the volume of each order and sometimes on the volume for a period were superimposed on these standard ones. These discounts were based on fixed units such as $100, $1,000, or $2,500 per order. Depending on the size of the order, they might run from 3 to 10 per cent additional. In a competitive situation, if the volume of an order was large, this type of discount might go even higher, with bidders figuring on some type of cost-plus basis.

(3) The third type of cost reduction stems from a reduction in the services required in the channels of distribution. When builders become large enough, they no longer require an intermediary to furnish credit, pool orders, maintain inventories, and give site delivery. Small builders do require these services, and the cost of the services is added to their price. Taking the small-dealer price as the base price, manufacturers grant part of this total price to others in the channel of distribution to repay them for the tasks they perform. These are spoken of as trade-channel discounts and may pay for retailing or wholesaling services. They will vary for such functions as difficult brokerage duties, acceptance of title and granting credit, and maintenance of a warehouse and inventories. When a builder or trade contractor assumes any of these functions or removes them, he may expect to have the base price reduced by amounts equivalent to the discounts granted those who normally perform these services.

Lumber, the most important material in the house, furnishes a good example of this type of saving. Since retail lumber dealers purchase in quantity, they pay the prevailing mill price and usually no further volume discounts are available to anyone. But if the large builder performs the dealer's functions, he can purchase at the same price as the retail dealer and can reduce his price by their normal markup. He can absorb the margin usually charged for performing the distribution function. Of course he also has certain additional costs for handling and overhead. After these were accounted for, the builder buying lumber in bulk saved in the vicinity of $10 per thousand board

feet, or about 11 per cent. The actual saving would vary somewhat depending on the particular channel or services used, but once the stage of direct purchases was reached, would not vary much with the builder's size.

The other items bought directly by the builder—millwork, cabinets, and hardware—showed reduced costs resulting from a combination of both trade-channel and quantity discounts. Small- and medium-sized builders usually bought these goods from retail lumberyards which, in turn, purchased either from wholesalers or from the mill. As the builder increased in size, he found these same channels open to him. As a result, his costs were first reduced by increased quantity purchases and then, if these became large enough, by elimination of a trade channel.

A standard interior fir door is a good illustration of how this worked in practice. This door, when bought singly from a lumber yard, cost \$10.25. The yard's price to builders for doors bought for one house at a time was \$9.50. On the other hand, the medium-sized builder purchasing for five to ten houses at a time might have paid as low as \$8.25 per door from the retail yard, because the yard could get quantity discounts from the mill. The carload price on the doors would have been about \$7.25 each, and to obtain it, a builder would have had to buy a minimum mixed carload of doors and windows containing enough items for 40 or 50 houses. This price would therefore be possible only for the fairly large builder. The largest builders buying carloads at frequent intervals might have received a price as low as \$6.60 per door.

Nails provide an example of similar discounts available in the hardware field. The individual purchaser of 8d. nails paid 15 cents per pound. If he bought a 100-pound keg over the counter, he would still have paid \$12.50 per keg. The small builder, on the other hand, buying from the same retail lumberyard but including it in his total materials purchases, would have paid about \$11.35 per keg. The medium-sized builder who dealt directly with a wholesale hardware house would have paid, on the average, about \$9.70 a keg. As scale increased and purchases became larger, the builder buying greater quantities might have been able to obtain a price as low as \$8 per keg. If he got into the carload-lot bracket, he could then buy from a manufacturer, special jobber, or wholesaler, and would pay between \$7.25 and \$7.75 per keg. Since there are 400 kegs in a car, a direct

purchase would entail an investment of about $3,000 plus warehousing while the nails were being used.

Cabinets, on the other hand, were almost always bought directly from the cabinet shop or mill even by the small builders. For this item, the medium-sized builder buying for a small tract at one time would usually receive an additional discount of from 10 to 15 per cent. But for the large builder, cabinets are an example of products which follow an entirely different channel of distribution. As mentioned in the chapter on the large builder, many tract builders have switched from the plywood cabinet to steel kitchen fittings purchased in carload lots through special brokers who handle only items for tract houses.

It is also possible for builders to purchase their own lumber, millwork, and cabinet mills. They can use their assured markets to attempt integration of the fabricating process, with a view to further cost savings. Decisions as to whether builders should integrate the mill operations are difficult. The cost of mills is not great, but on the other hand, they tend to be a boom-or-bust operation. At various periods in the past, builders have been attracted by high milling profits or have wished to assure themselves of a guaranteed source of supply. Consequently they have actually purchased mills, or have become the sole selling agents for a mill, withdrawing the products necessary for their own use and selling the rest on the open market. The results of these operations even in the postwar boom period appear to have varied, and several firms have sold their mills.

The problem of reducing trade channels was a sore subject with respect to gypsum products, certain types of lumber, and many of the items purchased by trade contractors. Manufacturers in some of these fields refused to sell direct to builders under normal circumstances, asserting that it was unfair competition for their dealers. Chapter 9 will show that such restrictions apparently depend upon the amount of monopoly control in the individual products and were not important in most of the postwar period.

(4) The final cost reductions, though significant, are the hardest to ascertain and generalize. These reductions depend upon individual discounts which firms enjoy as a result of their purchasing power and bargaining ability. That such discounts exist and are important has been demonstrated by many studies, and examples were found to be exceedingly common in housebuilding. They are primarily a reflec-

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quantities, since the distribution problem consists simply of unloading pallets at several adjacent houses. But it is not worth while for the contractor to buy a carload of bricks, stock them in his own yard, and reload for each individual job.

In some cases, a large subcontractor who saves through bulk purchasing does not pass this saving on to the small builder of individual houses, whereas he does give the large builder the benefit of his lower cost. This discriminatory policy is possible because his smaller competitors must pay higher prices for the same material. For example, medium-sized floorlaying firms paid $198 and small ones $224 for the materials they used in houses built by both small- and medium-sized builders. Since on the small jobs the medium floorlayers were competing with small ones who had to pay the higher price, they did not pass on their materials saving, whereas on larger jobs they did.

To sum up the effects of size on materials purchasing, it was found that in this realm firms achieved their most spectacular savings from scale. When a firm expanded from the small to medium category, a saving of $400 was made on materials, almost half of the total cost reduction realized by scale. A builder in the large class saved nearly $700 over the small in materials outlays, or about 40 per cent of his total savings. Moreover, it is possible that even greater savings in materials purchasing might come with further increase in scale. The largest firms in existence at the time of this study made greater savings than the average in their group and possibly could buy at still lower prices if their size expanded further. Since these possibilities are projections beyond the range of existing knowledge, their magnitude is not certain. It appears probable, however, that simply through increased size alone materials prices for the items purchased in this study might fall an additional 10 to 20 per cent (fig. 11 and table 51).

The above figures represent a true cost saving because the distribution system has been simplified. It is, in effect, an increase in efficiency resulting from innovations in supply channels. The large builder needs and gets less service, and, in addition, he can absorb items of lower quality than can be furnished to the builder of individual houses. This means that a new system dealing in somewhat different items is in the process of being established alongside the traditional materials distribution system.

Effect of Scale on Subcontracting Costs.—In general, the effect of

increased volume on subcontractors' costs is the same as that on the costs of the original builder. The builder pays the subcontractor for an installed job, which must cover the subcontractor's purchases of materials, direct labor costs, and overhead and profit. As the size of the project increases, the subcontractor enjoys the same cost-saving possibilities as the builder, and in a competitive situation these savings will be reflected in a lower price.

It should be mentioned again that savings depend on the scale of the housebuilding project and not on the scale of the trade contractor. Until tracts become very large, there is no necessary relationship between the size of the trade contractors operating within the tract and its own size. Similarly, there may be no relationship between the size of the trade contractor and the size of the housing jobs he undertakes. In many trades, large firms do no housing work, whereas in certain others only a few large firms specialize in tract work. In many tracts, the trade contractors are small firms doing almost all their business in the one project.

The small builder of the individual house paid out $3,379 to his subcontractors for the typical house used in this study. This figure covered the subcontractors' payments for direct labor of $1,161 (34 per cent); for materials, $1,524 (45 per cent); and $694 (21 per cent) for overhead and profit. (tables 49–52).

Figure 11 shows the effect of changes in scale on the subcontractors' charges. It shows that the builder of a medium-sized tract paid about 10 per cent less for the identical work than did the small builder of houses on scattered lots. The large tract builder found his costs reduced by $722, or nearly 22 per cent less than those of the small builder, and if he was an extremely able bargainer, he may actually have saved somewhat more.

Of the amount saved by the medium builder, about $97 was due to savings in the subcontractors' materials purchases, $151 to more efficient use of labor, and $100 to savings on supervision, overhead, and profit. The large builder saved $259 on the materials purchased by his subcontractors, $217 on their use of labor, and $246 on overhead and profit.

Chapter 4 explained in detail the origin of these savings. The transition from work on scattered houses to jobs in tracts allowed the trade contractors to use their labor more efficiently, to improve their

estimating and controls, to save on materials, and to cut their charges for overhead and profits.

A good example of the more efficient use of labor and of an improved system of controls which become possible with increased size is found in the schedule of the floorlaying contractor. The average labor time on a typical flooring job is about 4 man-days, or 32 hours. Yet men must go to each job at four different times. Allowing a half-hour for moving from one job to the next on scattered jobs, the total wasted travel time is two hours, or 6 per cent. Added to this, there will be extra unproductive time in loading and unloading, getting into the house, and getting acquainted with the job and its layout. In a tract, however, where the houses are adjacent to each other and the layout of the jobs is similar in the houses, most of this time will be saved. Furthermore, the builder can make certain that all potential savings are achieved by using better controls. Since the jobs are identical, it is worth while spending more time and money in establishing the proper rate of work,—this overhead cost will be amortized from the savings on all future jobs—and the rate can be more easily controlled. In addition, the knowledge that future jobs are assured makes the mechanics more amenable to working at a faster rate.

Passing over the savings realized by trade contractors in their materials purchases, which were discussed in the preceding section, we find that their saving on the final cost category—overhead and profit—is, percentagewise, the greatest of all. Although the absolute money saving accompanying growth in size is of about the same magnitude for this factor as for labor and materials, the percentage of reduction is much greater, running about 35 per cent as compared to a 17 per cent fall in materials costs and 20 per cent in labor.

In reality, the amount of cutting of overhead and profit may exceed the typical amounts shown. Discussions with individual builders indicated that when there is a great deal of competition among the trade contractors, the charge for profits falls nearly to zero, and overhead is also greatly reduced. Interestingly enough, however, the exceptionally low prices may not be available to the largest of the large firms, since these very low prices arise primarily from small trade contractors competing vigorously to obtain a large job. The largest firms cannot afford to take a chance on these small trade contractors who operate without overhead or much system. Their jobs are too big. They must have the

assurance that the trade contractor will complete his work on time. Therefore, they frequently attempt to decrease their risk by paying somewhat higher prices to larger and better-established trade contractors.

Incidental Costs.—There is a final class of miscellaneous direct costs, mostly minor, which have been grouped together. Included are charges for permits, utilities, surveys, plans, and—most important—the charges for financing construction. The total amount of these charges is about $410 for the small builder of the composite house, or slightly more than 4 per cent of all costs.

Many of the items of this group are charged on a per unit basis; consequently, no saving is realized through increased scale. In others, such as surveys and plans, there may be variation with size, but the items are small, and important differences occur only when an architect is employed. In an architect-designed custom house, of course, plans and design are a major cost but usually are not assumed by the builder. On the other hand, small and medium operative builders cannot afford custom design. This is not true of the builder on a large tract job; if an architect is employed, his overhead can be spread so that custom design will cost no more than stock plans on the smaller jobs, and, as suggested earlier, his design may bring improved efficiency.

The principal differences in incidental costs were found in direct financing charges—that is, in the amount which must be paid for the construction loan on the house. Financing payments included the amounts required for title insurance, appraisal and recording fees, lending fees, and interest on the money actually advanced. They averaged slightly more than 2 per cent of the total cost of the house.

The advantageous position in financing enjoyed by the large builder has already been described. In addition to the benefits accruing to him indirectly, through land profits, ability to expand, and so on, he also profited directly through his ability to initiate a large volume of loans. The cost of a construction loan to the large builder averaged only about half of that to the small, the difference lying in the fees paid by the builder or the premiums paid to him. At various times, builders have collected as much as $300 per house for originating the loans. At such times, the builders' incidental direct expenses would have totaled zero—obviously a decided saving due to scale.

Effect of Scale on Indirect Costs

The difference between the direct costs of a firm and the price at which it sells its product is its operating margin. Figure 10 showed that these indirect costs rose from $741 for the small firm to $1,334 for the medium firm, and to $1,608 for the large. While direct costs fell with increase in scale, indirect costs rose by 117 per cent. The percentage of the total index going to indirect costs rose even more rapidly because the higher dollar expenditures in these categories were combined, for the larger builders, with lower expenditures in the other classifications.

For several reasons, explaining why indirect costs change as they do is far more difficult than analyzing the reasons behind the fall of direct costs. In the first place, though it is certain that increases in indirect costs accompany growth, the estimates of the dollar magnitudes of the changes are subject to a larger error than in direct costs. In the second place, because these values as they appear on balance sheets are not those required for economic analysis, dividing indirect costs into the basic components of overhead and profit is hard. Finally, a comparison of the values and services received by different firms for the sums expended is made difficult by the heterogeneity of the factors. It is hard to decide whether differences in the sums spent for overhead and profits reflect variations in efficiency or changes in the nature of the inputs purchased.

Overhead Costs.—There are really two questions to be answered in analyzing overhead charges. To the first—Does the amount spent change with scale?—the answer is, yes. To the second—Does the amount spent increase faster than the benefits realized?—the answer is not clear. Great variation is found in the overhead services to firms. Some firms cut direct costs by increasing overhead, as, for example, in replacing labor by expanding plant. In other cases, overhead increases the efficiency of the direct factors and thus reduces the amount paid for them; for example, improved organization may make possible a cut in the amount of labor used. Such considerations make it difficult to measure whether the efficiency of overhead changes with scale.

The importance of overhead costs in our modern economy is a familiar idea. Most discussions of decreasing costs and simplified explanations of the advantages of large-scale production assume that firms have falling unit costs because the charges for important indi-

visible factors, such as management and plant, are spread over more units as production increases. If no indivisibilities existed, all units could be produced at a constant cost. In addition, it is overhead (especially if it is truly fixed) that causes problems in slack periods. The costs of the overhead must be met, and if this cannot be done, the firm loses money. The size and inflexibility of the overhead, therefore, are important factors in determining risk.

Overhead costs are frequently defined as those which are common and cannot be allocated to individual units. They also tend to be fixed over quite wide areas of production. When a firm is organized, a decision is made as to the manner in which the overhead or management functions will be performed. The structure decided upon can then be used to handle a rather large number of units, but at certain levels, if production is to be further increased, revisions must be made to expand overhead.

We consider as overhead all costs of supervision above the level of working foreman, all office expenses, depreciation of equipment, selling costs, rent, and the cost of capital not borrowed specifically for the construction of a particular house.

In the chapters devoted to the small, medium, and large builder, a description of the organization and overhead costs of each type of firm was included. The overhead structure of building firms starts at an extremely simple level and never becomes very complex. Its cost in the smallest firms ran about 2.5 per cent of the total, and in firms completing between 10 and 24 houses per year it had risen to about 4.3 per cent. In medium-sized firms, overhead cost was approximately 5.2 per cent, whereas in the largest category it amounted to 8.0 per cent. The dollar expenditures at each size level were about $240, $410, $480, and $700 respectively. The problem of overhead in housebuilding is not so much one of the magnitude of these expenditures as it is of the value received. Charges for overhead and profits average only about a third to a half of those for many manufacturing industries (tables 34 and 52).

The small firm pays very little for overhead, but at the same time gets very little in return. Its equipment is simple. Its records are sketchy. Whatever time the owner can spare for management must be used only for the most vital functions. No time is available for planning and study.

The situation has not changed radically in the medium firm. Here, expansion allows a small amount of warehousing and, consequently, some bulk purchasing. An office is rented, taking the place of a desk in the builder's home. Slightly more equipment is employed. The owner spends full time on management and may have one or two assistants. These changes enable the firm to make some savings through improvements in the production process and better bargains in purchases.

Among the firms classified as large, great variety is found in the size and activities of the overhead organization. Their staffs range from 3 to more than 50 in number. Some firms possess only small yards and storage facilities, but others handle all their own materials. Some deal directly with mills for all purchases; a few even own and operate their own mills. Some have their own subcontracting affiliates, perform their own architectural and site-planning work, and maintain complex systems of production control. Others still operate in the simple direct fashion of the medium and small builders.

Are the extra costs of overhead a sign of more difficult management problems in the larger firms and therefore an indication of a lower efficiency in the use of this factor, or does the increased overhead save enough of other variables to more than compensate for its additional cost? It is clear that without a minimum increase in overhead large firms could not make the savings they do in purchasing and labor organization. In such cases, the change in the function of overhead brings greater returns; the increased charges pay for more value received, and there is consequently no indication of any fall in efficiency with scale.

More importantly, within the group of large firms with the highest overhead expenditures, the quality of services received from the overhead is often superior. As a result, these firms get more for their money relatively than the firms which have remained as simple as possible. This is true when the larger overhead goes to purchase management capable of developing skills and techniques hitherto neglected by most housebuilding firms.

Profits.—Problems also arise in attempting to analyze profits. Profits, being residual, cover payment for the activities of the firm's entrepreneurs but may also include unearned income arising through accidental circumstances. In considering the way in which costs vary with

scale, we are interested primarily in those profits which are a necessary part of the cost curve. The synthetic cost curve for each size of builder should include only those profits received for essential functions and not those which were the result of windfall gains. At the same time, essential profits must include sums to pay for dynamic changes in the industry. They must not only compensate firms for their present effort, but also keep the industry alive and progressive. They must attract adequate capital and skills for future development. At present, the history of progressive housebuilding firms is too short to permit accurate judgment as to whether or not the portions of the existing profit level which appear to be windfalls in a static analysis are required payments for progress.

The median firm in the 1–9 class made net profits before taxes equivalent to 5.7 per cent of its sales volume. The median in the 10–24 bracket made 6.7 per cent. Both of these returns included profits in the normal sense but also compensation for the overtime work of the proprietors. Medium-sized firms averaged 8.5 per cent on sales, and large firms 10.0 per cent. In these two categories of firms, it is probable that, to avoid double taxation, the owners may have drawn amounts in salaries and expenses which overcompensated them for their actual managerial functions, and hence their profits on sales may be understated. This, together with the fact that large firms were likely to have minimized their real profits by listing them with affiliated enterprises, indicates a sizable increase in profits as scale increased—even greater than that shown (table 34).

If these large profits were all essential for the efficient functioning of the larger firms, then is much of the apparent efficiency of large scale, as measured by direct costs, illusory? Is it true that most of the savings in purchases of the factors would suffice only to pay for the unearned profits needed to operate larger enterprises? What is the answer to the level of profits required by these larger businesses?

The answer should be geared to a number of requirements. Profits are required to pay a return on invested capital, to reward innovators, to attract skilled management, and to compensate investors for possible future losses. Such payments are real costs, and if they vary with scale, would change the efficiency of various-sized firms.

The increased profits of large firms were not due to variations in the amount of capital invested per unit of output; in fact, the opposite is

true. Small firms have a larger investment per house produced than do large, and their return on net worth is less, rising from 13 per cent for the smallest to 20 per cent in the 10–24 bracket, 23 per cent in the medium classification, and to 30 per cent in the large (table 35).

Some of the added profits were certainly payments for innovations. The large builders made important shifts in the production function. Until these changes became widespread, the innovators made increased profits. Whether or not these payments for innovation were a necessary cost, they still tend to disappear if all firms use more efficient production functions.

The two final factors compensated for by profits may, however, require differential rates. Higher payments may be needed to attract to housebuilding skilled managements with adequate investment funds, and to compensate them for the additional risks that come with scale.

The small builder is attracted to the housebuilding industry partly for noneconomic reasons. Having been employed in it and being already familiar and at home in it, he naturally chooses to remain in it in his new status as a self-employed owner. He is willing to accept low profits, but does not contribute much in return. His participation is welcome, but he does not bring much management experience or funds—lack of which has been a major problem—to the industry.

Skilled managers with funds sufficient to operate large firms may not enter the industry if it offers only limited opportunities. At the same time, they supply needed services, an expansion in the scale of operation, and an accompanying decrease in direct costs. If they would not be attracted by the low profits earned by small firms, as appears probable, then some increase in the profit rate is a necessary condition for their entry and offsets the savings they bring in other costs.

The higher return of large firms may, in addition, be required to compensate for additional risks. If risk increases with size (as is discussed in the following section), then large firms must receive higher returns in prosperous periods, and these returns must be included in the cost curve.

It appears, however, that some of the differential profits were not of the required type, but were a combination of windfall and temporary monopoly returns. The tremendous surge of postwar demand clearly increased the profits of the entire housebuilding industry. Because of the way in which it made itself felt on the market, this demand

resulted in greater windfalls for large firms than for the smaller. The big builders were the ones which could answer the demand of the mass market, the area in which the largest growth occurred. Until sufficient expansion could take place to meet all the new demand, those already in the market reaped windfall-monopoly returns.

Although this discussion of profits must remain inconclusive, it does appear probable that the existing profit rate overcompensated large firms during the period of this study. Many of them, in fact, stated their personal belief that this was the case. If so, the total amount of necessary indirect costs is overstated in the synthetic cost curves of the composite house. One may still conclude, however, that the increase in efficiency from scale is less than the reduction shown in direct costs.

Effect of Further Increases in Size

Large builders as classified in this study build 100 to 1,000 houses per year. To date, few firms have surpassed this rate. No radical changes in the maximum size or type of housebuilding firms have occurred in the postwar period. Although larger firms are more important than in the past, prototypes of existing firms could be found in the prewar period. No Bay area builder, and none elsewhere, has jumped into a new super-large or colossal class. Few extend into more than two or three local markets, and none has spread over wide areas.

The principal difference between the largest Bay area firms and the largest firms elsewhere is to be found in the size of the particular markets in which they operate. A few large firms in other areas have produced 3,000 to 4,000 units in a year. Such a production rate is simply due to the fact that they are located in larger metropolitan areas and have a more populous market to draw upon. Their share in their own markets is roughly the same as that of the San Francisco firms that produced 700 to 800 units per year, and their methods and techniques are also of approximately the same scale.

It is worth while to speculate on what factors have hindered the growth of much larger firms. Why does no firm in the housebuilding industry hold a position comparable to that of General Motors in the automotive industry? The answer depends primarily on the manner in which costs change as scale increases still further, and therefore it must be considered as part of the present discussion. If costs continued to decrease with scale, one would expect larger firms to develop.

The reasons already outlined for cost changes would apply as well to changes with future growth. If firms became much larger, some of their costs for the factors of production might fall and others might rise, actual variations depending on the specific magnitudes involved. The problem of estimating the effect of still greater scale is simply that of determining the shape of the individual cost functions at higher levels of production and again aggregating them. Such estimations require extending existing cost curves beyond the limits of present data—an extremely risky procedure, since a further change in the size of builders might so alter the organization of the building process as to render current data irrelevant. Still, because of the intense interest in this question, the risk appears to be worth taking.

Turning first to the probable effect of future growth on the items making up direct costs, it has been observed that even within the size reached by existing firms, few additional economies of scale alone appear possible in the field of labor or subcontracting costs. Firms of existing size have already attained most of the economies of scale related to production on a given site. When a firm builds in projects of 200 to 500 units, it employs as much specialization in methods as is now known to be efficient. When it increases its size beyond this amount, it simply duplicates the same procedures. More crews perform identical functions instead of new processes being added. This holds true both for direct labor and for that of the subcontractors.

Since increasing the size of existing projects is not more economic, greater efficiency with scale would appear to depend either upon greater advantages which would accrue to firms running many plants all of the same maximum size as now exist, or upon radical innovations which would change the whole organization of the production process and make larger plants more efficient.

As the size of firms increases and they operate more plants over a wider area, some additional economies of scale in the purchasing of materials appear possible. For some items, even the largest existing firms are not yet purchasing in sufficient quantities to obtain the greatest possible discounts; and in some, they are still forced to go through distribution channels that are not the most efficient. Further increases in size would improve their purchasing power and result in somewhat lower materials prices, estimated to be from 10 to 20 per cent less.

As to other direct costs, since the cost of incidentals (e.g., surveys, utilities, financing) is already close to zero, further increases in size would have little effect on them. In land, far from bringing about any saving, increased scale would cause costs to rise; for it becomes progressively harder to find good, unused land in tracts of the size required for large-scale operation. Even now, the largest firms usually build in several separate areas in an attempt to overcome this problem.

When all these direct costs are considered together, it appears probable that any additional economies of scale would be from 3 to 5 per cent. These savings would result primarily from more efficient materials purchases, since the other direct costs would, if anything, have a tendency to increase with further growth.

Does the sphere of the indirect-cost functions hold more promise for further efficiencies with scale? It has, in other industries where the most important efficiencies of scale have been brought about primarily through better management and more efficient use of capital funds. Contributions to efficiency have also been made elsewhere through the ability of extremely large firms to wield an effective influence on the over-all organization of their industry.

In housebuilding, the most promising increase in efficiency appears to lie in better management. Even the largest housebuilding firms have spent relatively little time on planning and working out their production process. They have done virtually no research work in methods, designs, or materials. Increases in size beyond present limits might facilitate these activities by permitting greater specialization in management and the hiring of more skillful men. Large firms in other industries have discovered significant economies through improvement in these lines, and it would seem that larger housebuilding firms might profit by following their example.

Larger scale might also give managements greater scope for their activity. In a dynamic situation, large firms can alter the existing technology, as well as conditions in the supplying industries, and the market. It has been the hope of many that increased scale might bring about a snowballing of more effective action along these lines. This problem is dealt with more completely in the final chapter. There is nothing within the present situation, however, that makes such changes appear probable.

If there are possible sources of greater efficiency to be found in in-

creased size, there are also important inefficiencies which may accompany growth of firms. The four most important of these are loss of flexibility, increased marketing difficulties, production problems, and greater capital problems.

Housebuilding firms need both quantitative and qualitative flexibility.[1] Their total amount of output varies seasonally and cyclically; consequently, increasing their size and overhead will mean more unemployed resources and higher average costs when production is low. Qualitative flexibility is required (1) because the people purchasing houses have demanded variety at any given time, and if their tastes are catered to, many of the advantages of large-scale organization are lost, and (2) because there is a problem of reacting to changing tastes and styles. A firm organized to turn out a vast number of the same unit will find it very expensive to change if that unit suddenly ceases to meet with public acceptance.[2]

One of the most important advantages of existing firms may lie in their ability to react quickly to changing conditions. When fashion, techniques, and markets are in a state of flux, entrepreneurial decisions must be made frequently and rapidly. Small rather than large firms have a decided advantage here because the entrepreneur is less inhibited in his functioning. Examination of industries in which large firms fail to predominate shows that most turn out nonstandardized products in which this type of decision is important. Hoover sums up this factor as follows:

> In some businesses there are so many unpredictable variables in the production process (including procurement and distribution as well as processing) that the limits of ordinary human administrative capacity seem to be reached in a small enterprise operating only a single plant. Only a few enterprisers who possess exceptional abilities or have developed some relatively protected or stable line can operate on a larger scale.[3]

This quotation goes beyond the problem of flexibility and introduces the second limit to larger size, that of marketing. Houses are sold in a local market. They are attached to the ground; they meet

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[1] E. M. Hoover, *The Location of Economic Activity* (New York: McGraw-Hill, 1948), p. 81; Committee on Price Determination, *Cost Behavior and Price Policy*, pp. 223–225.

[2] P. S. Florence, *The Logic of Industrial Organization* (London: Kegan Paul, Trench, Trubner and Co., 1933), pp. 42–44, 262.

[3] Hoover, *op. cit.*, p. 82.

with many prejudices and peculiarities of local taste and custom. These facts cause difficulties and high costs for firms entering a new market. The skills of determining suitable areas for new tracts, of negotiating for land, of getting necessary approval, of fitting the houses to local taste—these have not been systematized. They are arts, not sciences. Successful firms know their own areas and can meet such problems through their past knowledge and intuition. But when they enter new areas, their existing knowledge is no longer serviceable. They can obtain the necessary data with which to enter new areas, but it is costly and risky. Therefore, they have done so only when they intend to produce an important number of units in the new location. This is a major deterrent to increased size. Unless firms can enter many new markets on either a regional or national scale, their maximum size cannot increase far beyond that of existing firms.

The third deterrent to size is the fact that expanded production and entry into new localities may also be accompanied by production problems. New labor must be recruited and trained in the firm's methods. Particular traditions and customs in working methods, inspections, safety regulations, and the like, may force changes in the firm's basic production procedures. It may have to train new subcontractors and materials suppliers, or else persuade the previous ones to move into the new area. All these problems again mean that expansion is expensive and may lead to marked diseconomies of scale.

Several facts seem to indicate, however, that the limit set by marketing is more important than that of production. In general contracting, where the marketing problem does not arise, experience shows that firms can spread over the whole nation without significant losses of efficiency. It is the merchandising problem for houses that causes the main cost increases. Housebuilders do spread out when particularly advantageous marketing conditions are available to them or when they get an opportunity to bid on houses which are purchased in a block by the government. Housebuilders have bid on Army or Atomic Energy Commission contracts all over the country. They also have established new tracts far from their headquarters when the demand was evident and very great, as, for example, when a new defense plant moved into a certain area.

The fourth and final factor which may lower the efficiency and hinder the arrival of still larger firms is the problem of capital and profits. There is the question of whether firms can raise sufficient capi-

tal to increase their size. There is also the question of additional risks involved in expanded size, or, in effect, how risks affect the cost curve for capital. Thus far, all housebuilding firms have been personally owned and financed. The jump to any larger scale of production would require much larger amounts of capital, which would be difficult to obtain. The generally unsuccessful record of those builders in the 1920's who were able to issue stock and appeal for wider ownership would make it hard for new firms to attempt a public issue. This, in effect, means that firms face a capital limit or capital rationing.

After a certain point, capital costs rise either because of the need to pay higher interest rates for more risky borrowings or to offer especially advantageous terms to prospective investors. There is also a point at which the cost curve for capital becomes vertical, indicating a complete lack of further available investment funds at any price. This point would be reached quite rapidly by most housebuilding firms.

This capital limitation and the failure of so many large builders in the past are primarily due to the great risks inherent in the building industry—risks which would deter firms from expanding even if they could obtain additional financing. Even the largest firms at present still remain comparatively flexible financially. Their overhead is larger, but they have a very small amount of sunk capital. If they have to contract rapidly, they can do so. The larger they get, however, and the more spread out their work, the more difficult would a contraction become. It is almost certain that the amount of risk rises faster than size and thus becomes another diseconomy of scale.

The increase in risk is connected with the fact that large firms have a higher leverage ratio (ratio of assets to net worth) than do smaller housebuilding firms or firms in most other industries. If these firms tried to expand rapidly in size and maintained the same type of high leverage, they would be increasing their risks at an even faster rate. A high leverage ratio means that firms make higher profits in a boom, but also sustain greater losses in a depression.[4] Any great expansion, therefore, means sacrificing safety margins for the possibility of additional profits, and this fact may act as an important brake upon the desire of a firm to increase past a given size.[5]

[4] Steindl, *Small and Big Business,* p. 43.

[5] Cf. W. Fellner, "Average-Cost Pricing and the Theory of Uncertainty," *Journal of Political Economy,* Vol. LVI, No. 3 (June, 1948), 250. See also the excellent discussion of the liquidity-solvency motive in R. A. Gordon, "Short Period Price Determination," *American Economic Review,* Vol. XXXVIII (June, 1948), 271.

Even if greater efficiency could arise with much larger size, it is still uncertain as to whether such a change would actually occur. Most observers are struck by the close relation in building between the size of a firm and the personality of its owner. This may tend to make the optimum size indeterminate within rather wide limits. Housebuilders are not drawn primarily from a group skilled in management; many are happy to have achieved as much as they have and feel little desire to expand.

Large firms experience continuous pressure caused by the rapid rate of entry of new units into the industry. The personal drives and desires of individuals to be entrepreneurs may bring about actual negative management costs in some small firms, whose owners work harder than paid managers and take out very little in expenses. Competition from firms such as these may make it difficult for large firms to expand their management staffs, yet such an expansion might, if it took place, lead to far greater efficiency and much larger size. The growth of large-scale production is a dynamic factor.[6] It does not proceed in any simple manner. Cost curves are not continuous but may have several ups and downs. This means that if a more efficient scale did exist with much larger size, firms would not, on this account alone, break into the lower area farther along the cost curve; it might require some fortunate coincidence of circumstances to achieve it.

All these factors point to the conclusion that unless a new, radically different, and much cheaper method of production develops, it appears likely that, though housebuilding firms may continue to expand somewhat beyond their present size, they will not rise into the super or colossal group and will remain much smaller than major firms in other large industries.

Summary

Growth in the size of housebuilding firms, at least within their present size range, is accompanied by improvements in efficiency resulting from division and specialization of labor, increased bargaining power of the firm, and elimination of certain processes.

Division of labor saves costs because each man does a specialized task, repeating it at more frequent intervals. This permits more mechanization to be used, together with simplifications in the form of

[6] Cf. K. E. Boulding, "Proceedings," *American Economic Review*, Vol. XXXVIII (May, 1948), 165.

patterns, templates, and other measuring aids. Materials prices decrease because the large builder requires fewer services in the distribution of his materials, and also because his bargaining power is greater. Especially when there is competition either at the manufacturing or distributing level, he can obtain price concessions because of the desirability of volume orders. For the same reasons, a decrease in the prices of subcontracts also occurs with increased size. The trade contractor can save on his labor, material, and overhead costs when he works on a large tract. He is forced to pass on these savings because of the competition for such large jobs.

The cost of incidentals and land also decreases with scale. Financing is easier for the large builder. Since rates vary from bank to bank and from area to area, the large builder has an advantage in that he can spend more time exploring the financial markets.

Because design and land were considered as constants in the composite house index, no specific estimates of cost changes in these spheres were made. The discussion showed, however, that here, too, important advantages accompany increased scale. Better design can increase efficiency through lowering the costs of the inputs required. Ownership of large tracts by the large firms enables them to capture some of the changes in land values that are lost to the smaller firm.

While direct costs were decreasing, indirect costs rose with scale. Small firms are characterized by an almost total lack of any real management. They also attract owners who will accept a low rate of return on invested capital. These two conditions are not true of larger firms, which must have expanded management staffs in order to operate at all and which must offer larger profits to attract competent executives and adequate funds.

The net result (fig. 10) of these conflicting forces was that costs of the large builder (including his operating margin and excluding changes in land and design) were 8 per cent less than those for the small firm and 5 per cent less than those for the medium builder. If possible windfall profits made during this period are excluded and allowances are made for varying design and land, the actual changes in efficiency due to increased scale would range from 12 to 15 per cent. This is the amount that can be saved in the building of a typical house by a large firm. Such a house must be built in or near a tract and cannot include custom changes. Those desiring custom features and

houses built on more expensive lots must hire a small builder and must pay additional amounts over and above these differences arising from scale. If they can afford such increased amounts, they may, of course, receive additional real value and personal satisfaction for their higher expenditures.

There is no indication that further important decreases in costs would occur if large firms continue to increase in size, unless further growth brought a complete change in the housebuilding process. Most of the direct costs approach their minimum point within the size of existing firms, the main exception being the cost of materials, which could continue to fall slightly. There is a drop in production costs at the site until production reaches a rate of two or three houses a day. After that point, additional economies are small, and the cost curve levels off with only a slight further decline as size increases.

Meanwhile, in opposition to the down curve in production costs, a point is reached where indirect costs turn up. As firms grow, they lose flexibility, which thus far has been vital in building. Marketing costs also rise. Housebuilding remains—and must remain—a local industry, and local markets are not limitless. A firm which arrogates to itself a greatly increased share of the local market will face added pressure of competition and higher sales expenses, which will shoot up as a power curve rather than rising simply in proportion to the firm's greater size.

The hazards of expansion are compounded not only with increased competition and marketing costs, but with increased capital risk. The larger the number of units under construction, the more dangerous become the possibilities of a decrease in demand, a shift in building cycle, labor troubles, supply difficulties, and so on. In theory, a very large firm might guard against labor and supply adversities by integration both vertically and horizontally. In practice, this effort is questionable because, though it might by-pass obstacles existing on the outside, it might also lead to too great inefficiency in operations inside the firm.

None of these cost changes takes place abruptly. The range over which the minimum cost for each factor applies is large. It is, therefore, conceivable that by husbanding their financial resources and improving their management and marketing organizations, the largest of existing firms could expand to four or five times their present size. Such an expansion would not, however, bring about any important changes

in efficiency. A firm expanded to this point would still supply only about 2 per cent of the national market and would still be about the size of a small automobile manufacturer. The difference in potential size between these two industries and the contrast between housebuilding and others appear to follow directly from the nature of the products involved.

9

Effect of External Restrictions

There is a widespread belief that a major source of the high cost of houses today is a drain by outside forces exerting various forms of extortion. Critics subscribing to this belief hold that the first step in reducing building costs should be the removal of external restrictions. The business and professional press frequently gives voice to this idea, and it is the main thesis of *American Housing*.

Although few specific estimates of the amount of inefficiency caused by restrictive forces can be found, the impression is common that probably half or more of the cost of a house is wasted in this manner. As an example, a conference held by the *Magazine of Building* reported its belief that savings of from 20 to 40 per cent would result merely by removing a few of the chief restrictions.[1]

Each of the principal suppliers to housebuilding has been accused of specific restrictions which result in inefficiency. It has been stated that materials manufacturers and suppliers have engaged in price fixing to keep prices high and have thus reaped excess profits, at the same time avoiding the necessity of introducing new materials and techniques. They have enforced distribution policies to bolster established groups against efforts to reroute materials around them and have hindered the opening of new channels of distribution and the elimination of unnecessary steps. In short, their policies are said to have made impossible the most efficient and economical supply of materials to the house.

Subcontractors, it has been stated, have upheld and profited from the cumbersome system of materials distribution, and their resistance to the integration of building operations has resulted in severe sched-

[1] "Round Table Report," *The Magazine of Building*, February, 1951, p. 116.

uling problems, jurisdictional conflicts, wastes, and damage. Critics declare that the use of many subcontractors and the bidding system lead to a lowering of quality and to instability in production relationships in place of the efficiency that comes with familiarity and continuity of association.[2]

The widespread accusations to which organized building labor has been subjected by the general public are certainly familiar to all. The main complaint against the unions has been that they needlessly increase the cost of housebuilding by their working rules and at times by limiting output per hour directly. Their practices are said to lower the actual output of units of work per dollar, in a market where hourly wage rates are thought by many to be already staggeringly high. It has also been claimed that the number of different crafts and their high degree of organization lead to frequent strikes and jurisdictional conflicts. Rationalization of the building process is hampered, it is said, by the problem of craft lines and the desire of the workers to maintain the existing number of jobs per house. Finally, critics aver that the practice of making entry difficult into the building trades has lowered the general efficiency of labor and kept the average age of artisans higher than it would otherwise be.

Building codes and the policies of financial institutions cause wastes when they require an excess amount of materials and of labor. In addition, they impede progress toward the most efficient design. Codes also help in enforcing the restrictions initially imposed by various groups. Since wastes and restrictions in any given area of supply are supposed to reinforce those of the others, the cumulative effect of all the restrictions is said to be greater than simply a summation of each. It is believed that the effect of this cumulation is to freeze the pattern of the housebuilding industry in its local mold and to deprive it of the flexibility and growing space that an aggressively expanding industry must have. New types of producing organization, new techniques and materials, and alternative methods of distribution consequently have a hard time making headway, according to many critics.

The leading reasons advanced for the prevalence of these restrictive practices are: (1) Since each part of the industry supplies only a small fraction of the final product, it neglects the effect of its price policy on total demand. (2) The amount of insecurity in the industry has

[2] Colean, *American Housing,* chap. 4.

been so great that all its components are willing—in fact, eager—to sacrifice potential expansion for increased security.

The first type of action is explained by the principle of derived demand. Because a house is composed of several hundred items of material and types of labor, each supplier's demand curve is derived from—but is different from—the general demand for housing construction. Since each individual is concerned with his own demand rather than with that of the industry, each will take action which, though appearing best for himself, may in the aggregate prove to be worst for all.

For example, a supplier of a certain material may furnish 1 per cent of a house. By doubling his price, if his unit sales remain constant, he would double his revenue, but would increase the price of the house by only 1 per cent. This small price rise would not appreciably change the total demand for the product. The supplier's demand curve depends upon the possibilities of substitution of other products and the competition of other dealers rather than on the primary demand for housing.

If this supplier operates in accordance with the general principle of free competition and attempts to maximize his profits, he will pay attention only to his demand curve, since his actions are too slight to influence the total demand.[3]

Some suppliers may even go beyond the limits of free competition and enter into restrictive price agreements. Since the price at which they sell is so important to their own income but so insignificant a part of the final unit, why should they not combine with their nominal competitors so that all may obtain a higher price? This solution is made more attractive by the second force—the desire for security. In this connection, *American Housing* states:

> Restraints in housebuilding can be partially explained as efforts of the subsidiary groups in the industry to acquire stability and security that cannot be obtained from chronically weak and unstable management in a restricted local market. Each group strives to protect itself as best it can. But interests are diverse and alliances shift. Manufacturers of building materials strengthen themselves by mergers or mutual agreements. These, in turn, endanger the position of local dis-

[3] This problem of maximization is, of course, basically similar to the problem of large group equilibrium in monopolistic competition. See E. H. Chamberlain, *The Theory of Monopolistic Competition,* 5th ed. (Cambridge: Harvard University Press, 1946), pp. 74–94.

> tributors, who consequently combine in self-protection. Subcontractors generally cannot individually resist the price pressures of distributors of materials on the one hand and of general contractors on the other. Hence they make intra-trade agreements. Finally, labor unions, faced with seasonal and sporadic employment, have often consented to act as the enforcing agents for restrictive agreements of subcontractors or suppliers in the hope of protecting their jobs and earnings.[4]

Finding the actual extent and effect of restrictions is of major importance in any study of housebuilding. If these forces cause significant inefficiencies, then the improvement of housebuilding requires the removal of the restrictions or the discovery of methods to circumvent them.

In this study of Bay area housebuilding, therefore, great emphasis was placed on scrutinizing these restrictions and estimating their total effect on housing costs. Previously there were no accurate data for this purpose. Careful examination of the plethora of statements on the subject revealed that few, if any, of them were based upon sound fact. It became clear that most estimates of losses due to restrictions were based on a few specific cases located in isolated cities, which might or might not have general application. For example, the problems of plumbing in Chicago, the use of wood in Denver, and of electrical installations in New York are cited over and over again. Is each of these situations found in all areas of the country? To establish the great loss of efficiency alleged, each of these conditions, and many more, would have to apply to every house built. Is this the case?

To answer this question, the external restrictions which the builder faced were examined in detail and an attempt was made to estimate their effect on cost. The study was based on the observed operations of builders and on their reactions to the groups with which they dealt, as well as upon specific surveys of each of these other classes.

The San Francisco–Oakland area is a good locale for such a study. It is one of the most highly unionized areas for housebuilding in the country. In many materials and service industries there is a long history of lack of competition, fostered in many cases by state laws aimed at reducing competition. Financial institutions wield a dominant influence on building. The area is split into at least 52 administrative

[4] Colean, *op. cit.*, p. 101.

units, each with separate jurisdiction over building. Only its codes, as we have seen, are atypical. They are probably somewhat more progressive than those in the rest of the country and may reflect benefits which other areas hope to reach in the next few years. But even this advantage is not an absolute one, since if one examined only the largest city in every metropolitan area, this region would appear no better than the rest.

It is possible that the results are less applicable to other areas than are most data in this study. Other cities may have different underlying situations. The particular time studied may also cause variances. For example, labor conditions differ greatly from what they were in the prewar period and may change still more in the future. During most of the postwar period there has been such a serious shortage of competent men in all trades that the unions have been less strict in enforcing rules and have maintained open rolls to qualified applicants, thus removing two important sources of friction from the scene. Contractors have been eager for men. With adequate labor and materials and as long as they paid no more than their competitors, they could make money no matter what the wage scale. The result of this situation is the common practice of paying above scale for efficient men, with the union scale acting as a floor. The labor shortage has also left building labor in an anomalous position with respect to the Taft-Hartley Act. Builders have not wanted to rock their profitable boat by demanding ambiguous rights. Rights to use certain materials, methods, and so on, theoretically guaranteed under the Act, have not been claimed. What might happen in a later, more competitive situation cannot be predicted from present circumstances.

Even taking into consideration possible divergencies caused by time and geography, it is believed that on the whole the following picture of inefficiency resulting from external restrictions is accurate for the Bay area, and that it reflects the situation in other areas more correctly than do most discussions.

Materials Distribution

Restraints in building materials can occur only if there is an absence of competition in a particular industry and then only if the housebuilder lacks sufficient economic strength to strike a fair bargain with the monopolists. Competition can be absent when a few manufacturers

control most of an industry or when illegal price and distribution agreements exist among manufacturers or local distributors.

It has been believed that housebuilders have faced restrictions from each of these sources. Some materials had concentrated production, some were controlled by illegal agreements, and sometimes the builder's bargaining power was weak. Examination of the Bay area situation indicated that restraints currently existed only in materials having a limited number of manufacturers. In other materials, either illegal agreements were not common, or else builders had sufficient strength to thwart them. Furthermore, even in the cases where a few firms did control the entire output, the larger builders were still able to obtain reasonable prices.

At least two-thirds of the materials going into the house come from competitive industries. Large- and medium-sized builders are frequently bigger than producers in these industries. (For example, even the smallest of large builders uses more lumber than is turned out by 90 per cent of the mills in the country.) As a result, these builders could use their bargaining power to the hilt, could obtain rock-bottom prices, and could insist upon the most economic channels of distribution.

Although certain large firms in these competitive materials lines sometimes set up distribution policies which theoretically prevented the builders from obtaining lowest prices, their attempts were not successful. If there is enough competition, the builder with sufficient purchasing power will either refrain from dealing with such firms and will get his supplies from the smaller, less established producers, or special deals will be made allowing him to get approximately the same prices from the firms which theoretically will not grant them.

It is in the one-third of the materials supplied by industries with concentrated control that real problems arise. Since competition in these industries is either indirect or oligopolistic, the controlling firms can establish price and distribution policies that are best for themselves, but are inefficient from the consumer's point of view. Little is known about the true efficiency of these pricing policies. Prices in these industries are more stable than competitive industries in periods of either rising or falling prices. Whether on balance this is good or bad for the economy is uncertain.

More can be said about their marketing policies. It is argued, for

example, that because of their market control, suppliers in these industries can insist upon unnecessary steps in the distribution channel, thereby raising the costs of materials. It is claimed that the prices quoted to builders do not vary with builders' size and that firms are forced to purchase through middlemen whether or not they require the services of these marketing groups. Those who believe that this constitutes a restraint state that prices should depend upon the quantity purchased and not upon the functions for which the purchasing firm is established. They say that a carload lot should be sold at the carload price whether to a dealer or to a builder. This point has been a subject of bitter debate, rising even into the realm of congressional investigation. No decision has as yet been reached.

Several industries have maintained that dealers' discounts are justified because a retail distribution system is necessary to handle the requirements of the small builder and the individual homeowner, and any attempt to short-circuit the system endangers it and constitutes unfair competition. Therefore, these industries established their discount arrangement on a purely functional basis.

In certain trades, sales are made by the manufacturer only to bona fide retail dealers. To qualify, dealers must sell lumber and building materials at retail. They must maintain and keep open to the public a yard, office, and sales force. They must carry sufficient inventories for a general public trade. In other industries, manufacturers have set up a firm distribution channel by agreeing to sell on an exclusive basis to a given wholesaler or to a selected group of wholesalers. When large builders approach manufacturers in industries where these practices prevail, they are referred to the dealer in their area, or the order may be accepted at the normal retail price with the difference turned over by the manufacturer to the dealer.

Builders and contractors hold that such a system is inefficient and needlessly raises the price of materials and therefore the final cost of the house. They maintain that when builders become large enough to purchase in the same quantities as the dealer, the latter's functions have atrophied and should be excised. They speak of any sums paid to the dealer on quantity-direct-shipment purchases as a rake-off or holdup paid without justification.

In certain instances this conflict is a semantic one. Some manufacturing firms do not set up any sales staff of their own, but prefer to

delegate sales functions to a broker or wholesaler for an entire area. These manufacturers are usually not equipped to deal directly with purchasers. In such cases the earnings of the wholesaler are usually equal to or less than the amount the manufacturer would have to pay for his own staff. This kind of arrangement is common. Some firms shift back and forth between some such exclusive distributorship and their own branches. In these arrangements wholesalers have a true economic function which is not a waste.

Even if these distributors maintain rigid prices and are less amenable to bargaining pressure from the builders, inefficiency cannot be proved. Manufacturing firms in concentrated industries make their firm price policies effective by limiting their distributorships. The fact of limited distribution is not in itself a waste. It may even raise efficiency.

There are other cases, however, where the mill or wholesaler is equipped to deal with builders but still insists that the additional channel of a retailer be used. Most observers think this a less desirable state of affairs. In the previous example, the wholesaler's markup includes only minor profits, selling, credit, and bookkeeping expenses—usually 3 to 5 per cent—which could not be eliminated, no matter who performed these functions. In the second case, the retailers' markup includes payments for handling, storage, delivery, and other services not required by the builder. It is a much larger and more important sum.

Although this controversy has not been settled, it was a somewhat academic question during the period of this study. This was not true in the immediate postwar period, when materials were in such short supply that, instead of obtaining discounts on volume purchases, builders frequently had to pay black market prices. During 1949 and most of 1950, however, supplies of many items had become adequate. Builders reported that they were able to make quantity purchases of formerly short items at discounts approaching those of the normal dealer. These discounts were obtained in three principal ways: (1) Firms theoretically wedded to the idea of giving only functional discounts, in actuality accepted builders' orders under various pretexts. (2) Builders established or purchased building materials supply affiliates which met the definition of dealers and therefore were eligible to purchase at dealers' discount. (3) Approved dealers were willing to

accept builders' orders for carload lots shipped directly to the builder's siding and on these to charge only a nominal (5 per cent) markup.

The results of these possibilities are reflected in the gypsum industry, where there is nominally complete protection of the distribution channel. The few large manufacturers state they will sell only to established dealers. Therefore, it might be supposed that all builders of whatever scale would have to pay the retail price. With adequate supplies, this was not true. In the period 1949–1950, medium-sized builders obtained occasional direct shipments and purchased others at a discount below that normally available to small builders. Average large builders received carload shipments upon payment of a nominal fee to retail dealers. The largest builders bought directly and paid the lowest price. Similar results also were obtained in the other concentrated industries.

The over-all situation, then, was one of active competition in industries producing the bulk of the materials for a house and limited competition in the others. In these latter industries, manufacturers do set price and distribution policies which might be inefficient for housebuilding. If the distribution methods are very inefficient, however, larger builders can secure relief. There is no clear indication as to whether or not the results of the remaining price and selling policies are wastes. It is probable that because of the large sector of supplies which is competitive, the total costs of materials are not unduly raised by restrictions.

Subcontractors

Many popular assumptions about subcontracting—that it lowers efficiency, raises costs, and leads to instability—are contradicted by our study in the Bay area of the reasons for subcontracting and its efficiency relative to its alternatives. Building appears to be one of the many industries where vertical disintegration increases efficiency and lowers costs without lessening stability. The fact that most large firms have tried integrating various of the processes normally subcontracted but have usually returned to subcontracting them, is of great importance because it shows that the present prevalence of subcontracting is the result of a policy deliberately adopted by builders after testing alternative possibilities. It would seem, therefore, to be based on solid economic foundations of greater efficiency.

The logic of trade contracting has developed as follows: (1) Efficiency reaches its maximum under specialized labor. (2) Specialized labor reaches its maximum effectiveness when applied regularly on many units. (A carpenter who specializes in dry-wall installation is most effective if he hangs only gypsum boards and hangs them continuously.) (3) The problem of sustaining specialized jobs as well as the coordination of the movement of men among them requires special supervision, usually performed by the trade contractors. (4) The trade contractor further assumes the function of furnishing materials and certain equipment, since he can frequently concentrate purchases of a given item for many houses.

Given a need for specialized mechanics, the builder gains greater flexibility and a decrease in the problems of supervision through subcontracting. Large firms have a sufficient volume of work in many of the subcrafts to warrant hiring mechanics on a full-time basis if they so desired. Ordinarily they would be allowed to do this, though in a few cases union regulations require the purchasing or establishing of a specialized subsidiary. However, experience shows that hiring directly is usually not worth while. The average skill of the men available would be far less than that of the men working for subcontractors. A firm attempting to handle specialized tasks directly would find its cost for skilled labor running higher on an efficiency basis than that paid by subcontractors. This is because subcontractors, by working for many prime contractors, can maintain a steadier work load. They retain their most efficient men on a full-time basis and turn to the less skilled labor pool only in unusual circumstances. Even when new men are hired, the fall in average efficiency will be slight since it will depend on the ratio of new men to the total number of employees; and indeed such a fall need not occur at all since the temporary employees can be given relatively unskilled jobs. In contrast, since builders cannot guarantee steady work over any long period, they must reconstruct their specialized crews frequently, and so their entire labor force will be drawn from the pool of unskilled men.

The planning for and supervision of a large number of different skills and crafts can also be handled more efficiently by subcontracting. If the builder hires labor directly, it must be supervised. Most trade contractors charge approximately the same amounts as the builder would have to pay for his own supervisors. Furthermore, the sub-

contractors' supervision and planning are likely to be more effective. A Jack-of-all-trades will usually prove less efficient than a man skilled at one. In addition, the trade contractor has a ready-made profit incentive for cutting costs, which the builder would have to attempt to duplicate by some sort of bonus or profit-sharing arrangement.

These are the reasons for the existence of subcontracting. What, however, of the claims that the trade contractors raise their prices unduly by carving out private preserves from which they bar housebuilders? Given the need for trade contractors, it is not surprising that they may attempt, like other businessmen, to combine to lower competition. Since entry into these activities is so easy that competition in most periods is extremely active, combines are frequently believed desirable by both the trade contractors and the unions.

The purpose of the combine is usually said to be simply assurance that all active contractors in the trade will use a sound basis for figuring their costs. It is claimed that with unrestricted bidding, those accepting contracts at less than cost, probably because of error, will skimp on the job, will attempt to correct their error through sweating their labor, or will go broke, causing losses to labor and suppliers. Although many of these claims are undoubtedly true, a serious problem exists, as was evidenced in the history of the NRA, in determining when restraints really correct existing evils and when they lead to monopolistic profits.

For any type of combination to be effective, entry must be restrained. This is why trade contractors have in the past attempted to control the issuance of licenses, materials distribution, or the supply of labor. However, although these potential methods of restraining entry may exist, their importance in the period of our study has apparently not been great. In almost all trades, competition was keen. In most, both materials and labor were fully available to builders.

Builders in this area state that the only instances where subcontractors have been at all successful in restricting entry into residential trade contracting for any periods have been in plumbing, electrical work, and lathing. The methods used have been primarily through control of materials supply or labor. Even in these instances, however, rather large numbers of trade contractors remain outside the trade associations. Where bid depositories exist, as for example in the electrical field, they are mainly effective on public or large commercial and industrial buildings. They do not apply in the housing market.

In addition, the large builder has the opportunity, if he desires, to set up his own firm in these fields or to take over an existing firm, thus placing himself beyond the reach of possible gouging.

The picture does change, however, when entry into a subtrade is limited or scarce materials are channeled through existing firms. The balance of power swings, and the big builder may no longer be able to obtain low prices through his wide bargaining power. The profits of the trade contractor rise sufficiently for the builder to attempt integration. In shortage periods, the quality of performance may fall so that the builder feels it necessary to control particular subtrades in order to guard against delay on his whole schedule. Some large firms in the immediate postwar period assumed additional functions for these reasons, but by the period of this study they had almost completely dropped them. Such functions might well be assumed again in a new shortage period.

The absence of integration during most of the period, even though it could have been present, leads to the conclusion that the subcontracting system flourishes not because the builders are its helpless victims, but because they have found in the vast majority of cases that they are better off using subcontractors than attempting to perform the same functions directly. The fairly low average markup to large builders of only 15 per cent, which must cover the trade contractors' cost of equipment, overhead, and profits, is an indication that competition rather than restraint characterizes the field. In addition, the relationship between a builder and his subcontractors is stable, with bidding the exception, not the rule. It thus appears that the subcontracting system does not lead to excessive costs either in efficiency or in stability.

Labor

The attempt to measure labor efficiency exemplifies the difficulty of ascertaining appropriate standards. Far different judgments would result if measurements were made against an absolute standard instead of a relative one. Because no absolute standard exists, however, the best that can be done is to settle for relative criteria and compare the efficiency of housebuilding labor with that of other industries.

It is outside the scope of this study to discuss or judge the aims of the labor movement in general. Such labor aims as union recognition,

good working conditions, security, adequate wages, no speed-up, and premium pay for overtime are the equivalent of standards in other areas and industries, and are not treated here as sources of inefficiency, though they may raise costs. Rules that might be listed as restrictive are those which aim at unnecessarily increasing the amount of work, requirements that an excessive number of men be hired, jurisdictional conflicts, and attempts to keep wages above the competitive level by restriction of entry. It is often very difficult to draw the line between the two types of regulations. For instance, is the prohibition of incentive wages a method of halting the speed-up or of restricting output? Are the existing overtime provisions reasonable, or do they stem primarily from a make-work and share-work tradition?

The method followed in this study was first to list the restrictions most commonly attributed to unions, and then to check these by a survey of the unions' rules and practices. Information was elicited through discussions with both the unions and the builders. In addition to specific questions on restrictions, contractors were asked about their general problems and attitudes toward labor. Finally, all this material was put together by relating it to the costs of building the composite house.

Some method of summarizing various practices had to be found. Each of the twelve international unions and the approximately eighty-five locals involved in the construction industry in the Bay area has its own set of rules and regulations. Not only does each of these differ from the others on paper, but there are many variations in interpretation and procedures, and in the enforcement of regulations among locals and with respect to individual builders and specific jobs. It is usual, for example, to find that regulations are enforced with much greater thoroughness on commercial building than on housing. A potential restriction may apply in one union but not in another, in one local of a union but not in the adjacent one, to a particular builder or only to a particular job. It is important to keep in mind this lack of uniformity when making statements about labor efficiency, since the situation tends to be oversimplified in the minds of many. It is possible to find examples to support almost any view for or against labor efficiency, but it is erroneous to use isolated instances, as has frequently been done, to draw up a sweeping indictment. The effect of each type of regulation on individual houses and its total importance

to the entire cost structure must be ascertained if a true picture of the situation is to be drawn.

Those rules and regulations which are claimed to be restrictive and to raise costs fall into six rather distinct categories, namely: (1) prohibitions against owners working with tools; (2) "upgrading" of specific tasks; (3) prohibitions against use of particular tools, equipment, and methods; (4) excessive jurisdictional requirements leading to conflicts and strikes; (5) limitation of output, and (6) constriction of entry. Every one of the unions can differ with respect to each of these conditions.

In the first case—the working on the job by owners and employers—regulations run from one extreme to the other, from complete freedom for the employer to complete prohibition. A good example of the first type is the bricklayers. A large number of masonry firms working on new houses consist only of the owner (who must be a union member) plus a hodcarrier. These firms specialize in work on fireplaces and are a major influence in the field. The carpenters, laborers, carpet layers, and teamsters also allow the owner to work, though they specify that only one owner-member of the firm can work, and usually he must belong to the union.

In the next group are the painters, plasterers, cement finishers, roofers, and sheet metal men. In these trades the employer may work on the job if he employs a journeyman to work with him. Finally, lathers, electricians, and plumbers have a strict rule against the employer's working with tools.

The reasoning behind these restrictions on working employers usually goes back to the union's fear of piecework or lumping of labor. It is claimed that if a man is allowed to contract simply for the sale of his own labor, there is no way of insuring against his accepting a job that will actually net him far less than the standard wage rate. Such competition would gradually erode the union scale.

The rule obviously has little or no effect on housing costs and efficiency except for the three unions which prohibit the employer from working at all. No matter what the regulations might be, single-man firms are not important in work on new buildings. On the other hand, we have seen that owners performing site labor and handling their overhead functions in their spare time make up the most common type of shop. In the three trades where the union forbids such action,

isn't overhead raised unnecessarily? The answer is yes, but for small firms only. The net effect is primarily to strengthen the importance of medium and large firms in these trades. These larger firms start with a basic cost advantage in purchase of materials and use of labor. Small firms, to offset this advantage, must have a lower overhead. If the owner cannot perform overhead functions in his spare time, lower overhead is impossible to achieve.

It is probable that in any case the prevailing price for subcontracts would be that set by the medium or large firms who do the bulk of work, whether or not aided by such a regulation as this. If the competitive price would be set by the firm in which the owner is spending full time on supervision, the restrictions against small firms would have no direct effect.

These regulations do mean, however, that the competitive fringe of one- or two-man firms is removed. Smallest firms are restricted to the repair and maintenance field and can work on new houses only on a nonunion basis. This may account for the fact that it is in the three trades with this type of regulation that most complaints have occurred about lack of competition in periods of shortages. When the smallest contractor is not available for bargaining purposes, a competitive price exists only so long as there is competition among the larger firms. A competitive situation did exist during 1949 and 1950, but builders stated that it was not apparent during the war nor the immediate postwar period. They expressed fears for what the present and future crises might bring. This working rule and potential lack of competition were cited as among the factors leading to integration or quasi-integration of electrical and plumbing work, and as responsible for the complete absence of lathing in many units after the war.

The second problem is that of upgrading of work. This can take either of two forms. In one it is claimed that too many foremen (who receive a higher wage) are required and their work is too limited. In the other it is claimed that work which could be done by semiskilled or unskilled men must be done by journeymen. The question as to when regulations of this type actually become restrictive is most difficult. Unions enforcing such rules usually claim that they are necessary to keep up the level of skill.

It is fairly clear that in the aggregate the first form of upgrading is not important. Half the unions leave the hiring of foremen to the

employers, though they do specify a higher pay scale when one is appointed. The remainder insist that a foreman be designated when there are three or more men in the crew. The amount of regular work the foreman can do is limited only in isolated cases. As a result these regulations do not increase costs in the majority of cases, though when they do, it can be extremely annoying.

Upgrading of work often involves an interdiction against the handling of materials by common labor beyond a certain stage of production. These instances are not numerous and, because of the nature of housebuilding, are not important in this industry. Most housing crews are too small to make it worth while to hire common laborers to do tasks in which upgrading is a problem. Moreover, in shops with permanent crews, these restrictions are overlooked and jobs are handled in the most convenient manner. Regulations of this type become more important (and will be discussed) when the question of innovations is raised.

Again, in the third type of restriction—prohibiting use of particular tools, equipment, and methods—actual cases exist only in certain trades. Unfortunately, the trades in which they may be most prevalent are those which bulk largest among the trade contractors on the average house—plumbing, painting, and masonry.

As examples, the plumbers, in addition to requiring skilled men to handle certain jobs, have also traditionally required that fabrication be performed on the site. This apparently has limited the amount of prefabrication and standardization on rough plumbing installations. A new agreement allows work to be done in shops or factories anywhere in the 46 counties of northern California, providing that the employees doing the work are members of the union and receive the union scale. This, for the first time, permits prefabrication for an entire area. Whether it will be used is still not certain, as previous agreements limiting prefabrication to the shop on the site are still followed. Under these agreements, the employer is allowed to introduce any tools or methods he desires. Most plumbing work for tracts is done through a form of shop prefabrication, but possibly, under the new rules, a standardized system could also be developed for scattered houses.

The painters' agreements also appear to include certain restrictions. The most common and important are those forbidding the use of

spray guns and of brushes of more than a certain designated size (varying from local to local). The reason for these rules and the effect on painting efficiency have been debated vehemently for the past thirty years. Contractors in the area feel that the rule on size of brushes is unimportant. They believe, however, that some cost savings would be possible if sprays could be used.

Most other union agreements specify that there will be no limitation on the use of new tools and equipment. Whether this provision is followed is hard to determine. It is clearly followed in some trades, such as carpentering, where the job has become almost completely mechanized. In others, however, new mechanized tools have made an appearance but are not widely used. This is true of mechanical trowels in cement finishing and of taping machines for dry walls. It is usually explained that the lag is caused by the difficulty of training both the employee and the trade contractor in new methods. Both are slow to adopt innovations. The lag may also reflect an unwillingness of labor to work with new tools. It is not possible to judge from existing data whether the adoption of such tools or similar ones is being retarded by union opposition. A possible test of whether union opposition is responsible for lag in use of tools which have frequently received a big play in the press (mechanical bricklaying methods, for instance) might be an inquiry as to how extensively such methods have been adopted in nonunion areas. If mechanical methods are not in use outside the union's jurisdiction, they probably have simply been overpuffed and are not truly efficient, rather than being held up by union objection. One must distinguish between paper ideas and true innovations.

The fourth complaint against unions in the building field has been the claim that they are too prone to strike, and that a large percentage of their strikes is over jurisdictional matters in which the builder is only an innocent bystander caught in the middle of labor's own wars. As we have seen, however, in the postwar period, this has apparently not been true. The number, importance, and duration of strikes in building have been roughly the same as for other industries.

Of course it is possible for jurisdictional problems to be cost consuming and lead to inefficiency even if there are no strikes. A prime complaint of builders is the difficulty of taking workers into the jurisdiction of other locals of the same union. If a mechanic has to be paid

a day's wages to do only a few minutes of work, this, too, will increase costs. However, on most housing jobs where these situations occur, the jurisdictional rules that are onerous are usually overlooked. As a rule, there is only one craft in a house at a time. The crews are small and have worked together. They do not stand on formality or trade rules, but get the job done.

The fifth point is concerned with specific limitation of output. This has been a controversial point for years, but one on which little information is available. Almost all union contracts have a specific ruling against limitation of output, and unions claim they adhere to this ruling. On the other hand, employers frequently feel that their employees could do more work if they wished.

All contracts give the employer the right to hire and fire as he sees fit. This is, of course, the main stimulant to efficiency. The mechanic must meet average production rates or lose his job. The problem is really whether or not these averages are held down by tacit agreements among the workers. Most feel that specific limitation does not exist, but that as a result of a general labor shortage, efficiency has fallen. Since men are not worried about getting another job, there is no great pressure to exceed the average rates unless bonuses are paid.

Related to this is the question of travel and show-up time. Employers hold that it is inequitable for them to be required to pay excessive travel time or for whole days of which the men work only part. The men, on the other hand, see no reason why they should go unpaid simply because the job is at some distance or the employer is too inefficient to arrange a full day's work.

The final major complaint concerns restricted entry. It has been stated again and again that unions have ignored the public welfare in regulating the number of workers in the labor market, preferring to keep low the number eligible for work so as to maintain high wages. Entry has been held down, it is claimed, by long apprenticeships, by high initiation fees, and by closing the union rolls.

The actual number engaged in construction in California increased by 108 per cent between 1940 and 1950, whereas the number employed in all industries was increasing by slightly less than 60 per cent and the total civilian labor force increased by less than 50 per cent (table 57). Obviously, the construction labor force expanded far more than did the general labor force. But in addition, during this period, the

members of the trade unions in the building field increased by more than 350 per cent.[5]

At the moment, most unions are working under preferential union agreements. Under these agreements, employment preferences are given to members of the union, but if the union cannot furnish an adequate labor force, the employer may hire anyone he pleases. When this occurs, the man is usually required to join the union within thirty days.

All unions state that their rolls are open to new members. If a man is qualified, he has the right to join. Qualification in a skilled craft usually means four or five years' previous work in the field and either a testimonial of skill or a satisfactory examination.

The initiation fee and dues of the unions have not changed much since the prewar period and thus are relatively lower, since present wage rates are so much higher. The majority are set at $100, though some are as low as $50, and others require ten days' base pay, which could amount to $200. Normally, these fees can be spread over long periods by depositing an application fee of $10 or $20 and then paying 10 per cent or a similar ratio of earnings until they are cleared. The rates are not likely to exclude mechanics seriously wishing to join.

The area has a very active apprentice program. Under state aid, it is run by joint committees of the contractors and the unions in each trade. The apprenticeship agreements are formal, outlining the topics to be covered, the hours of specific types of work to be accomplished, and the amount of formal schooling required during the apprenticeship period. There are more than 3,000 apprentices in the Bay area in the building trades, compared with no more than 200 in 1940.

The training periods are still long. They average four years in most trades, with a proviso that a year can be eliminated if sufficient skill is demonstrated by that time. Many claim that this amount of time is far too great in proportion to what is actually learned. It is also felt that even the present number of apprentices is not sufficient to furnish the number of journeymen required for replacement and expansion in these trades.

This brief survey has shown that some of the complaints against labor inefficiency appear justified. Many of the specific charges can be

[5] Department of Industrial Relations, State of California, *Union Labor in California, 1940–1949* (Sacramento: State Printing Office).

proved in individual cases. Some unions do prohibit owners from working with tools; some require an excessive number of foremen; some prohibit use of the best tools; the apprentice program is long; piecework is not allowed. On the other hand, the number of strikes and of jurisdictional conflicts has, at least in the postwar period, been greatly overemphasized. When restrictions of various kinds do apply, they usually apply only to two or three of the twelve crafts. The number of men who have entered the industry and the unions has been large compared with the general increase in the labor force.

The attitude of builders toward their labor reflects the accuracy of the above observations. In addition to the specific problems which have been discussed, builders were asked for more general comments, with questions such as: How are the firm's relations with unions? How often do unions check work? Do working rules hinder operations? How does the firm rate the efficiency of its men? What are the chief problems? Would the firm like to make any changes in its method of operations? In what manner is the firm affected by restrictions? The general organization of the labor force was brought out through questions on turnover, methods in hiring, and so on (Appendix D).

Builders had few complaints against working rules or restrictions in the two unions (carpenters and laborers) whose members they hire themselves. More than 95 per cent of the firms replied that their relationships with these unions were good. The small percentage that had difficulties was concerned primarily with jurisdictional problems. Both the carpenters and laborers pride themselves on stressing increased efficiency, on having no rules against power tools, new methods, or the like. The builders were aware of this, but they did complain that the average mechanic was not worth the rate he received. The war and postwar carpenters' boom brought in many relatively unskilled men. (In this area, they are spoken of as "men from the shipyards.") A comparison of efficiency wages in the postwar and prewar periods showed why owners have been driven to distraction. It was not evident, though, that their complaints were any louder than those of employers in other industries. The condition reflected a seller's market for labor—a fact implicit in the familiar statement that all that is needed to improve efficiency is a 10 per cent unemployment rate.

In general, the trade contractors' reactions followed those of the builders, though they were not as satisfied with their labor relations

as the builders were. They dealt with a multiplicity of crafts and unions and, as stated, the number of rules is great. Complaints about cost-increasing restrictions were more common among trade contractors, though they varied from craft to craft.

The relation between builder (or trade contractor) and mechanic differs somewhat from the popular idea. Basic labor skills were likely to vary with the size of the firm. Most small builders (60 per cent) maintained their same crew constantly. They felt that these employees were skilled; they were used to working with them, and they attempted to give them steady work. It was not a case of calling the union and asking them to send out available men for a day or a week. Even when they did not keep the same crew constantly, most contractors were able to hold their best man or men. Only about 15 per cent of the small firms changed their crews after each job or group of jobs.

This stability of the working relationship was important. With small crews, many were willing to perform jobs normally falling under other jurisdictions. When the men would not do these jobs, the owner frequently did them himself. This eliminated a problem which could become troublesome and expensive if it entailed hiring a special mechanic for some small job. The ability to disregard craft lines was simplified by the fact that with adequate work, unions checked the jobs of small builders only infrequently. About half the small builders reported that the job was rarely, if ever, visited by union business agents. One-fourth stated that such visits did occur occasionally, and the other one-fourth had rather frequent contacts with one or the other of the unions.

Larger projects were much more closely supervised by the unions. The informal breaking of rules common on small jobs was no longer possible. As many builders stated, when one gets 10 or more men on a job, someone carries the working rules in his pocket. Then crafts have a steward on each job, and his relationship with the management becomes more formal, since he goes more by the book.

All contractors also believed that they might solve part of their problem if it were not for the unions' restrictions on incentive wage plans. In many nonunion areas, mechanics are hired on a piecework basis. This, it is held, eliminates the question of inefficiency. The unions, however, forbid piecework on the traditional grounds that it leads to a speeding up which is disastrous for the workers' health and

welfare. Unions claim that builders have the right to fire anybody not putting out a full day's work; they are at liberty, further, to hire anyone more efficient, who will then be taken into the union. In addition, builders can, and many do, pay for efficiency, though bonuses must not be based on piece rates.

Another practice to which the builders objected was the charging of very heavy premiums for overtime. They claimed that the current system, which calls for time and a half for the first four hours of overtime with double time for the remainder, Saturdays, Sundays, and holidays, was wasteful. They stated that the stress on the short five-day week was a carry-over from the period when jobs were short and that it had nothing to do with health or welfare needs. With the shortage having become one primarily of labor, builders would like to have Saturday pay revert to time and a half with double time prevailing only after a certain number of extra hours.

In addition, small contractors complained about jurisdictional conflicts between adjacent locals of the same union. (As an example, the laborers' union in one county has been unwilling to grant working permits to men from locals in the adjoining ones.) The regulation in this matter varies from union to union. Some have no restrictions against men from other locals, whereas in many, complete freedom of transfer is permitted only if the local cannot meet the demand. Others permit only 50 per cent of the men on the job to come from outside the area, and some allow only the foreman to be brought in. With small, closely knit crews especially, this need to add men from outside the home county could become a decided hindrance.

The problem of weighing the validity and quantitative importance of these various claims is extremely difficult. It is clear that the main question is that of the average efficiency of men receiving the union scale. Are they less efficient than those in other industries? Could their efficiency be improved by piecework without causing a speed-up? Is existing inefficiency the result of poor management, poor workers, or poor union regulations?

Measurement requires a shift from the theoretical discussion of labor costs to an examination of the costs attributable to various kinds of labor and the restrictions which affect each. This shift can be accomplished through use of the composite Bay area house which was developed for the purposes of this study and which has already been

discussed. It is important to know the relative importance of the crafts in the total labor picture in determining the effect on efficiency of their union regulations. Obviously, even if a trade near the bottom of the list is completely inefficient, it adds only very little to the cost, whereas any cost-increasing rules instituted by the carpenters or painters would have a significant effect.

The carpenters received $1,372 out of a total labor bill of $2,646 paid by the small builders, or slightly more than half the total wage bill (table 50). The painters received 14 per cent of all wages, the laborers 10, the plumbers and masons 7 per cent each, the electricians 3 per cent, and all the remaining crafts received slightly more than 7 per cent.

It has already been stated that few, if any, restrictions were imposed by the carpenters and laborers. The earnings of masons, who were primarily self-employed, were directly related to their own effort and efficiency. These crafts accounted for 69 per cent of the total labor cost of the house.

It is probable that a slight increase in efficiency of the direct labor would result if all restrictions were removed. Some increases may, of course, occur as time passes and the vast number of new men become adjusted to the new trade. On the other hand, even under the existing system, the most efficient of the large firms have been able to reduce their direct labor cost to about 8 per cent of the final price. These are organizations which, because of their size, must adhere strictly to all union regulations. Considering the large amount of work done on the site, it is difficult to imagine any significant reduction below this level. Failure of other firms to obtain equal efficiency might well be attributed to their failure to adopt the best possible procedures rather than to union restrictions.

Thus, the problem of labor restrictions comes down to a question of the severity of their effect in the remaining trades employed by the subcontractors. The total wage payments to these eight groups vary from $819 in the small builder's house to $687 in the large. Several of the unions do seem to have rules and regulations which many outside observers believe restrictive. What proportion of their total wages can be ascribed to restrictive regulations and how much would they receive if their tasks were done under the most efficient conditions?

Although this whole subject is one of conflicting testimony, it does

seem important to set some outside limit to the possible extent of inefficiency imposed by these external factors. Failure to do so leads to probable overemphasis.

Ascribing one-third of the total amount received by these trades to union restrictions would be a high estimate and more than adequate to cover the true situation. Eliminating this proportion for these trades would mean a possible saving of from $230 to $275 per house. In addition, it is possible that even the other three trades against whom no complaints have been made do have some restrictions which lead to inefficiency. Assuming that these are from 10 to 20 per cent, and eliminating this percentage for these three trades, would mean a further saving of $100 to $250, depending on the size and efficiency of the individual builder. Adding the two estimates, to account for possible wastes in all crafts and all labor costs, it would appear that a maximum estimate of labor inefficiency would run from $330 to $525 per house, or from about 3.5 to 5.0 per cent of the total cost.

Local Governments

Although there are several possible areas of conflict in interests between builders and local government units, the principal governmental constraint upon builders occurs in the sphere of building codes. It is widely believed that unsatisfactory building codes cause houses to be built inefficiently; that the builder is forced to use poor designs or to waste materials and labor. If the codes were changed, it is held, important sums could be saved.

This problem of building codes breaks down into three parts: (1) Can good basic uniform codes be prepared with the existing technical knowledge, and can they be as efficient and practical as possible? (2) Given good basic national codes, are they adopted locally? If not, how do local codes compare in costs with national ones? (3) How well are codes administered?

The first of these questions is probably the most important, but it is outside the scope of our study. There is widespread dissatisfaction with codes throughout the country, particularly because of the belief that they require too much structural strength. Sufficient data to judge the validity of these opinions, however, are not available. There is very little knowledge as to what a good building code should or should not include.

About the only thing on which general agreement can be found is that building codes are necessary. For lack of a better standard, therefore, in judging performance, in this study the uniform national codes are accepted as adequate but not excessive in protecting health, safety, and efficiency. Of course, to the degree that the uniform national codes are poor and inefficient, so, too, is their local effect. This is a sphere where more efficiency may be brought about through greater technical knowledge.

If, however, the level of knowledge embodied in the various uniform codes is accepted as a standard then the question arises as to how the Bay area codes compare with this standard. Chapter 6 pointed out that almost all Bay area localities adopted the uniform codes by reference. Adoption was without amendment in areas where one-third of the houses were built. Amendments were minor in areas where half of new housebuilding took place; in the remainder, somewhat greater restrictions applied. The problem, then, is one of ascertaining the potential wastes caused by these variations. For this purpose, a comparison can be made with the uniform codes, even though it is recognized that some of the local variations may actually be justified. So far as this is true, the following discussion actually overstates the amount of waste and inefficiency.

In discussing wastes, it is important to differentiate between wastes of specific items and inefficiencies in terms of total inputs. Certain codes may be relatively wasteful with respect to a given material, all materials, or labor, but they may still be efficient in cost terms. The latter is our concern here. Do codes increase the inefficiency of building by raising its costs? The problem of wastage of materials is far more complex than is the problem of economic efficiency. Certain codes may require use of the same material but in different sizes, as, for example, 4-inch pipe instead of 3-inch. In this case, a direct comparison of the excess amounts required by the more restrictive code is possible. In other cases, however, if codes require different materials, the attempt to relate them directly makes no sense unless some outside criteria are established. For example, on a cost basis, a code that requires galvanized steel pipe for water pipes is restrictive because the total cost of such an installation is somewhat greater than one made with copper. If, however, it is desired to save copper as a critical material for defense purposes, obviously the code would be justifiable.

Another factor to observe is that since metals are relatively cheap, large savings in materials may have little or no effect on cost. It is impressive to say that if the electrical codes in this area requiring rigid conduits for service entrances were amended, the total amount of steel required would be cut by 50 per cent. It is somewhat less impressive to say that as a result of this change, the total savings for all units built in the San Francisco Bay area in a given year would be about 50 tons of steel. Perhaps even less impressive is the statement that such simplification would mean a saving in the cost of the electrical installation in a house of between 1 and 2 per cent, and that the saving in the total cost of the house would be between two and four hundredths of 1 per cent (i.e., 0.0002).

An illustration of the effect of code amendments may be found in the code for San Mateo, a small city on the peninsula south of San Francisco, and the area with the most amendments to the building code. Relating the changes its code requires to the typical house used in our study, it was found that the effect would be to require the foundation of the typical house to be increased by 6 inches and to require ratproofing. The stucco variant of the typical house would also be required to use either wood or composition sheathing instead of stretched wires. These restrictions would raise the cost of the typical house by something less than $100 for the first items and something less than $250 with the special sheathing. These figures are representative of the largest increase in costs resulting from the most restrictive building codes in the area.

Similar minor differences were found with respect to the electrical and plumbing codes. The two main electrical codes in use resulted in variations in total installation costs for the typical house of between two and four dollars. In fact, because of the rough estimating system used by most electricians in scattered houses, it is probable that there would have been no difference at all in quoted prices. The most restrictive code in the area might have required about a $10 cost increase, but this would be extreme.

The facts with respect to plumbing are the same. Although the code variations were more numerous, plumbers in the area stated that the differences they made in the cost of building were nominal. In one or two areas, costs may have been increased by $25, or about 3 per cent of plumbing costs. But since some of the rural areas with a large

amount of tract housing have had less stringent requirements, total costs for the area were probably slightly less than those which would have prevailed if all had adopted the uniform code.

In summary, in houses built in the localities where the uniform codes applied without changes—some 33 per cent of the total number built in the area—no inefficiency could be charged to the restriction of codes. Fifty per cent had their costs raised by less than 1 per cent for the typical house through code alterations. Even in the case of the final 15 to 20 per cent, where greater code restrictions were in force, the increased costs did not run more than 3 per cent above the uniform code areas.

The final question concerns the administration of codes. Are delays incurred as a result of the necessity of obtaining permits or inspections? Are inspectors arbitrary in their interpretations so that procedures which would be allowed in most areas are banned under the identical code elsewhere? Finally, what about the possibility that costs will be higher because of the necessity of working in areas with different regulations?

Although some instances of delays and arbitrary rulings were reported, most builders in the area stated that neither was of any consequence in the total cost of the building. Between 5 and 10 per cent of the builders reported that they had occasional difficulties in obtaining inspections on time or in having their plans approved, but the remainder said any delays or problems were unusual. They pointed out that they had worked with the various inspectors over long periods and that they knew what was expected. Occasionally, a new inspector might raise some question over what had been traditional methods, but these were usually ironed out amicably without serious delays or expense.

Part of this satisfaction may, of course, simply indicate that the average builder was not an innovator. He was building a house in a traditional manner, familiar both to himself and the inspector. When a new design was desired, the first one or two units might require discussion with the inspector and perhaps a few small adjustments, but these played a minor part in the over-all picture. What would happen if radical innovations were attempted cannot, of course, be predicted from previous experience. The average builder has not desired to make any startling changes, and, therefore, the administration of codes has not been a problem.

Difficulties which might have been expected to arise when builders and trade contractors worked in various localities under separate codes and inspectors were not important either. This follows from the fact that builders and trade contractors, being small on the average, usually operated in only a few localities. Factors other than codes localized work.

Because of this pressure toward localism, a trade contractor normally will not leave his usual neighborhood for a single job. He will enter a new area only if he intends to do a fair amount of work there or to undertake a tract or a group of houses. In this new location, some problems of code interpretation may exist for the first job or two. After a few jobs, however, he will have adjusted himself to the new code and administration.

The difficulties encountered in working under two or three separate codes were irritating, but most firms agreed that the problem is usually so minor that it does not enter into cost estimates.

Under this heading of administration and differences between localities, it may be said that codes are an important factor to builders only if they expand their operations into new areas covered by different codes than the ones under which they have previously worked. But even in this case, as firms increase in size and acquire large tracts in the new area, the problems raised by the new codes quickly lose their importance. It is necessary and worth while for such builders to become familiar with the codes in the new area, but the differences are so slight that it is not necessary for them to undertake expensive studies or make costly errors.

In the Bay area, at least, the restrictive effect of codes has been greatly overemphasized. Less than 1 per cent of the money spent for housebuilding was attributable to known code inefficiencies. It must again be stressed, however, that this estimate does not take into consideration possible improvements in the national uniform codes, the efficiency of which it is not possible to judge in this study.

The Efficiency of Financing

The actual sums paid out by builders for financing the construction of their houses constitute the least important of the factors which make up the cost of a house. Before the imposition in 1949 of service charges on borrowers, the financial charges against the house were only about

1.5 per cent of the selling price. Some then doubled or, in extreme cases near the end of the period, tripled, reaching a high of 4.5 per cent of the selling price; but the average went up only to slightly more than 2 per cent.

These costs, which include title insurance, appraisal and recording fees, as well as interest on the money actually advanced, were rather high compared with interest rates paid in other industries; however, there are several elements which differentiate housebuilding loans from other industrial loans. The builder was able to borrow larger amounts with less equity than most other industrialists, a fact of great advantage to him since his business was more risky than most. His high costs were incurred so that firm liens might be placed against his property under construction, giving a great deal more security to the lender than notes secured only by the firm's general assets. If the builder had had to increase his equity, he might have had to offer returns far larger than the interest payments, or again, he might have found it impossible to expand at all.

For these reasons, the fact that the builder's rates are high compared with those of other industries does not necessarily imply inefficiency. The cost of borrowing was not a main factor affecting his efficiency, but the conditions imposed on him by the lenders and his relations with them, particularly with the Veterans Administration and the Federal Housing Administration, were important. His encounters with the regulations of these agencies were frequent and complicated.

More than half the builders in the Bay area reported difficulties in dealing with the Veterans Administration and the Federal Housing Administration which they felt raised costs or lowered efficiency. These problems are of two types: (1) those of purely procedural nature, and (2) those involving rulings and interpretations.

During the spring and summer of 1950 when the interviews for this study were conducted, the outstanding complaint of the builders concerned a procedural problem—the processing of applications. During this period, the government agencies had some of the largest processing backlogs in their history, and processing periods exceeded two months and, in some cases, extended to four or more. This was a serious handicap to builders.

The period of processing affects building methods and costs at two main points. The first is in the timing of the starting dates for indi-

vidual projects and units. The builder must have a firm or conditional commitment before he starts work. If this is delayed, he may have to break up his organization, have his overhead continue uselessly, and then build up his labor force *de novo*. Such a situation was apparently not uncommon during this period. Resources were wasted and costs increased. The second impact of processing delays hits the builder who is awaiting the return of his equity funds. After a house has been completed, a builder has equity tied up until the sale is concluded and he receives payment. His equity funds are then freed for a new project, and, at the same time, the borrower begins to meet the interest payments. When the processing of purchasers' applications is delayed, completed houses stand vacant until the applications are approved. The builder has the choice of slowing up the construction process or allowing the vacancies to exist. Either is obviously inefficient and wasteful. If the delays average two months beyond the normal period, the waste might easily add $100 to the cost of a house.

Another difficult procedural issue primarily concerned the small builder. This involved methods of filing plans, making corrections, and so on. It appeared that large builders, who had men specializing in handling their applications for financing, were not bothered by such mechanics. Smaller builders had difficulty meeting the processing requirements. When their applications were rejected for procedural reasons, they were bewildered as to what steps to take.

The second main type of problem, concerned with the method and content of the rulings and interpretations made by these agencies, is even more important. A sizable percentage of builders believed that current appraisal methods lowered the efficiency of building and led to higher costs and lower value for the ultimate consumers.

The problem is actually one of design. Do the existing appraisal methods lead to the most efficient methods of design in the sense that the purchaser gets the maximum value for his housing dollar, or do they penalize good design by lowering the return to the builder who puts better value in his products?

The builders who objected to present appraisal methods stated that they believed the net effect was to lower the quality and value of housing and also to block any innovations that builders might wish to make. It was generally believed that appraisals were based upon a standard minimum house, similar to the typical house of this study. As long as

a builder constructed a minimum house of this type, he had smooth sailing; any deviations would cause difficulties.

Appraisals made no allowances for higher costs resulting from differences in quality. Therefore, builders furnishing above-minimum quality would either have to absorb cost differences or attempt to sell houses with larger down payments. Since quality was not credited in appraisals, the small builder either had to lower his standards or restrict his operations to higher-priced houses. Traditionally, most small builders have specialized in higher quality units both in materials and workmanship, but many were forced to lower their standards.

A cursory examination of appraising and inspecting methods of government agencies indicates that these criticisms are probably valid. It was extremely difficult to judge quality either by plans or during construction in the rapid inspections made by these agencies. Appraisals were made on a purely quantitative basis. Builders recognized that in the type of market that has existed, in which sales have been based primarily on monthly and down payments, any who priced above the appraisal level were penalized. As a result, there is evidence that the minimum standards tended to become the maximum.

The still more complex problem of innovations in design has received some national attention but no adequate solutions. The Federal Housing Administration has traditionally followed the line that any innovations must be appraised from the viewpoint of a conservative financial institution. Since any innovation obviously is more risky from this vantage point (even though it might be less so from the viewpoint of general government policy), it must be given a lower appraisal. This means that any changes in design away from the conventional standard minimum house have been penalized.

Designs that might either lower the cost of building or increase the value of a house have led to lower appraisals. When a firm has slight tendency to change, the conservatism of financial institutions makes little difference. When it is intent on innovations, it may resort to great effort and adroit maneuvering and pressure on the government's financial institutions. The most serious effect will be felt among those firms in the middle, who might occasionally have been willing to attempt something new but who have been deterred because of this financial pressure toward greater standardization. As a result, design has probably lagged behind its normal rate of progress.

The Net Effect of Inefficiencies in Factor Supply

This discussion of inefficiencies imposed on the housebuilder by outside elements has been limited to a consideration of the problems and relationships existing within the present framework of the industry. It is possible, of course, that efficiency would be increased by alteration of the entire organization of the building process, and that inefficiency is increased by the inability of housebuilders to change the make-up of the factors going into their product. Perhaps the inflexibility of each factor reinforces that of the others so that the whole is much greater than the sum of its parts. Although such a possibility exists, the next chapter indicates that it is not a strong probability. The total effect of restrictions in the factors of supply does not appear to exceed the aggregate of the impacts of the respective factors. Therefore, a simple addition of the restrictions as they have been shown to exist gives a fair indication of their total effect.

The most important point, observed repeatedly in each area of potential restriction, is that results will vary with the times and even more with the state of supply and demand for materials and labor. Thus, with adequate available supplies in both materials and subcontract prices, the large contractor paid no excess costs. He was able to get a competitive price. Only when shortages occur is the builder forced to go through high-cost channels.

The small builder bought his materials from retail dealers and did not enjoy the bargaining power with trade contractors possessed by the large builder. This might raise materials prices and the cost of a few subcontracts. There is no indication, though, that either of these groups in this area was less competitive than business as a whole. In fact, the contrary is probably true. A larger percentage of items going into a house is probably produced under conditions of more vigorous competition than is true in most other parts of the economy.

In labor relations, the same story of variations emerged. The postwar period has been one in which there were more than sufficient jobs to go around. As a result, many so-called restrictions have been relaxed, particularly for carpenters and building laborers who do the bulk of work in the house. The principal problems in these trades concerned the inability to use incentive-wage plans, the apparent lowering of efficiency as a result of rapid expansion in the postwar labor supply, the conditions of entry, and the rigorous rules for overtime.

Certain additional restrictions appeared to exist in other trades, as observed, for example, in the prohibitions by painters with regard to sprays and certain size brushes, the demands of other unions that jobs be handled by journeymen and not by laborers, that foremen be hired, and so on. These, it appears, do increase the cost of the house.

When it became necessary to estimate the cost of these restrictions, any figure was at best only an approximation and subject to wide error. Certain magnitudes had to be kept in mind. The total labor content of the median house in the area was about 24 per cent of its cost. How much, then, of the amount going to site labor was due to outside restrictions? Guesses ran all the way from zero to 20 per cent of labor costs, or from zero to 5 per cent of the total cost of the house. The latter should probably be taken as an outside estimate. If all possible restrictions on the use of labor were removed and labor became as efficient as it is in other industries, the total cost of the house might be reduced by 5 per cent. The possibility of checking such a guess is not great, however. Various methods could be tried. It might be possible to compare costs on similar union and nonunion jobs; but even here, other factors are likely to be more important in determining actual results.

The next most important items of waste result from unnecessarily restrictive building codes. Totaling all types of variations, we found that combined inefficiency or additional costs attributable to failures to adopt the national building codes exactly was less than 1 per cent for the area as a whole.

The inefficiency of the government agencies in the financing field was of a different sort. During much of the period under discussion, inability to process applications rapidly enough may have increased costs of the particular units being processed by as much as $100, with the average per house running to about $50. In addition, there are some indications that improvements in design may have been retarded.

Summing up these restrictions, we find that by making the estimate purposely high so as to show the outside limit of the problem, perhaps as much as 7 per cent of the cost of the house, or $650, was due to restrictive forces outside the firm. This estimate, if anything, overstates the problem for the housebuilding industry. Most industries have similar problems.

10

Performance of Housebuilders

Workable or Effective Competition

The final step in evaluating the performance of housebuilding is concerned with management and the over-all organization of the industry. Although housebuilders play the leading part, the way in which they play it and the results which they obtain are affected by their own interrelationships as well as by the action of other groups and forces. The men and firms composing the industry are only partial masters of their own efforts. The present picture of the housebuilding industry, in addition to being a creation of housebuilding management, also reflects the interplay of the basic competitive situation, changes in the scale of operations, and workings of the factors of production—forces over which the managements have little control. Reflected also are the results of increased demand and of shifts in the government's programs.

Attempts to evaluate performance in an industry are commonly spoken of as the determination of the requirements for "workable competition," as well as the measurement of the actual situation based on these requirements.[1] This terminology is used because, in most industry studies, the problem under consideration is whether or not there is sufficient competition to insure adequate performance. In housebuilding, though the same language can be used, much of the discussion has been concerned with the opposite problem of whether there is not too much competition to give best results. Many observers have believed that the industry is so competitive that the quality of the product, of progress, of management, and of use of resources suffers. In evaluating performance of the industry, therefore, one must consider both the possibility that there is not enough as well as the possibility that there is too much competition to insure the best level of product, selling costs, profits, flexibility, and efficiency and progress.

[1] Cf. Joe S. Bain, "Price and Production Policies" in (H. Ellis ed.) *Survey of Contemporary Economics;* Edward S. Mason, "The Current Status of the Monopoly Problem in the United States," *Harvard Law Review,* Vol. 62, No. 8 (June, 1949), 1266–1285.

The Position of the Product

The first criterion against which performance in the housebuilding industry must be measured is the adequacy of its product. The primary question is: Does the industry offer the best possible product in terms of what consumers would want if they were well informed of all the possibilities which exist for changes? The quality of the product depends upon its design, materials, and method of fabrication. It also depends upon meeting certain standards about which an average consumer cannot be expected to be informed.

Adequate performance requires that the industry meet three separate product desiderata. First, the product should furnish maximum livability through good design, both in its internal and external arrangements. This means the best possible use of space within the house, the proper location of the house on the site, and the suitable layout of the neighborhood. Second, the product should be designed to facilitate the most efficient methods of construction with the least possible waste of resources. Third, the quality of the house must be such as to permit low maintenance costs and minimum obsolescence. The costs with which the average house buyer is concerned are not only the immediate payments but also those expenses which will extend throughout the future. The gratifications in which he is interested are not merely the immediate pleasures of home ownership but the future stream of satisfactions. He wants the greatest shelter satisfaction for his money, maximum utility in terms of livability, and minimum total expenditures for the life of the house, obtained through a proper relationship between initial costs and future expenses for maintenance, depreciation, and obsolescence. Low initial charges and gingerbread ornaments for immediate sales appeal are not adequate. Experience in many fields has shown that a minimum cost product is not necessarily the least expensive, for if its low-cost production depended on use of shoddy materials and workmanship and a skimping on size and design, its future costs would be far higher than they should be and its satisfaction less.

The problem of quality is double-barreled. Builders attempting to furnish a good product and buyers attempting to acquire one, both encounter difficulties. The inherent nature of the problem itself acts as an obstacle to good design.

For the builder's part, his ability to affect or improve the design of his product is, to a large extent, dependent on his size. If he is a small contractor, he has little or no design function, since he works from the architect's or owner's plans. If he is a small- or medium-size merchant builder, his design function is circumscribed again, because he builds in settled neighborhoods where houses must fit into already established surroundings and have the widest possible appeal. He believes he cannot risk an appeal to the small segment of the market possibly interested in innovations in design. Such buyers usually can afford and do demand the right to participate in their planning, rather than buying another man's ideas already built. Hence, the small- and medium-sized builders seldom innovate. The large builder, on the other hand, has a high enough volume so that even a high initial cost for planning can be spread until the cost per unit is low. He develops new areas and usually assumes the responsibility for the land planning and selection of sites as well as the design of the individual structure.

It is the large builder, then, who can innovate, but even he does not receive as much guidance as he might hope from the market. He does not know what consumers actually desire in housing. Consumers' choice is constrained by a limited market, by factors of financing and price, and by the fact that they are offered only packaged products with a largely predetermined neighborhood environment. Their actual purchases give little indication as to whether or not they are satisfied.[2]

On the buyer's part, even his limited powers of choice may not be fully exercised. People remember with nostalgia the houses they grew up in, much as they recollect mother's cooking, a fact which makes most attitudes conservative and traditional. Changes in design, even if they hold promise of great improvements, may meet with prejudices and resistance. Furthermore, homeseekers are usually not well informed as to the true value of houses. They do not know whether the design and construction of the house meet the desiderata for the best product.

This lack of consumer knowledge makes the builder's attempts to change his product more difficult. If the builder's existing product is selling, investment in product change will increase his costs and may decrease existing demand, lower profits, and increase risk. The builder who navigates by records and controls knows that as soon as he changes

[2] Catherine Bauer, "Social Questions in Housing and Community Planning," *Journal of Social Issues,* Vol. VII, 1 and 2 (1951), 3–6.

from his existing pattern, he is on an uncharted sea and may founder. New costs can be estimated only roughly from the old. He has to train his crews and trade contractors in new ways, thereby incurring another expense. Supply sources are used to the old methods, distrustful of the new, and may cause him additional troubles. As stated previously, financial institutions also may create breakers.

Since the builder may receive no increased returns but will certainly encounter additional costs, risks, and headaches through improvement in design, such expenditures frequently strike him as wasteful. All these difficulties have diverted builders' attention from the quality of their product. Being human, they have been interested in building the units that involve the fewest problems. The result has been a continuation of existing design and a neglect of innovation until some change was forced, either by a more progressive builder who did change, by the need for a new selling point, or by the appearance of a proven, sure-fire, cheaper method.

Performance in the whole area of product has suffered as a consequence of this static design policy. The answer to the primary question on product is: No, consumers have *not* received the best product available.

Most observers believe that neither the structure, design, nor the site plan of the average builder utilizes the best techniques. It has been pointed out that the typical large-scale builder's house lags far behind developments in architectural knowledge. Some improvements have been made, but they have come slowly. Critics, comparing the average house with the exceptional one, show that though some builders have invested in good design and have been able to achieve more livable space at less cost, the average builder still has far to go.

Other types of product improvement suffer the same disabilities as does design. For example, the few builders who have experimented have demonstrated that a slab floor or an integral ceiling-roof (flat-top) is cheaper and can win consumer acceptance, and that improvements can be made in windows and in other phases of the product. But the majority's organizations and methods are not geared to innovations, and they have adopted such improvements only slowly.

Again, the static situation which obtains in the area of innovation for product improvement prevails in the field of product quality. Most of the larger builders have tended to build minimum quality units. The majority of builders sell to a given buyer only once and do not

think of developing a continuous market. It is difficult for the average buyer to judge quality, anyway. The type of paint job, finish of millwork, extras in foundation or framing are not obvious to him, and they do not affect the price the builder can obtain. For these reasons, most builders have offered, as a rule, only that quality necessary to obtain lenders' approvals and sales, without considering the effect on future costs of any particular material or method. By comparison with the average and poorest performers, the exceptions dramatize how much progress the industry as a whole could still make in product quality.

The improvements in quality which have taken place have most often occurred when new materials or techniques were shown to be both better and cheaper. In addition, some firms have deliberately maintained a higher quality of product than the regulations or the market required, sometimes in the belief that offering better houses might maximize future earnings, and sometimes simply as a carry-over of the craft tradition. In still other cases—the small minority—there have been true innovators who have had daring and the desire to try new ideas. These few entrepreneurs have found that the traditionalism of the over-all organization of the industry was not as great and insuperable as it seemed. If they were determined to institute changes, nothing actually halted them. They faced greater problems in innovating than they would have if they had been satisfied with traditional methods; but this was part of the game, and these men enjoyed matching wits against odds. For the majority, however, to whom the course of least resistance was the pleasantest, the prospect of greater problems increased their own inertia and reinforced their reasons for not making changes. Neither housebuilding managements nor other parts of the over-all organization were interested in innovation. In fact, the contrary was more nearly true of all groups. Consequently, the housebuilding picture has included no element concerned with the product. There has been little to guarantee the consumer a best buy, and good quality has been a hit-or-miss proposition.

The Question of the Market

Closely related to the question of creating the most desirable product is that of the most desirable method of marketing it. Although the problems of quality may not be wholly in the hands of housebuilders

to solve, it is in their province to determine the methods by which houses are merchandised. In determining their merchandising methods, they face three issues: the costs of selling, the breadth of the market, and the satisfaction of consumer wants. How they meet these issues spells market performance.

The issue of distribution cost is the most important determinant of merchandising performance in many industries. In housebuilding, however, since houses are a necessity, particular interest has been expressed in the breadth of market, and more attention has been paid to the housebuilder's choice of the market to which he will appeal than to any other criteria. The least emphasis has been given to the issue of satisfying consumer wants because a minimum of information about who the consumer is and what he wants is available.

Reliable information about what the market is and what it demands is essential to wise selection of merchandising methods. The skill of a producer in obtaining market knowledge is his key to successful market performance. Better market knowledge might enable housebuilders to answer such questions as these: Would larger investments in distribution costs improve performance? Should houses be produced for all segments of the population—the broadest possible market—or for limited groups? Are consumers satisfied with what they are getting, or should designs and locations be changed to suit different wants and needs?

If selling costs alone are considered, housebuilders' marketing performance would appear extremely efficient. There is no significant wastage in distribution costs. The actual expense of selling the finished product is one of the lowest of all industries. Two forces previously mentioned—the huge postwar demand for houses and the government's credit policy facilitating financing—have combined to simplify sales problems and lower selling expenses. Sales effort has almost simmered down to making known the availability of houses and accepting the orders. Often, the total sales expenditure has been as low as $75 per house, or less than 1 per cent. Seldom has it risen to 5 per cent. The probable average in the postwar period has been about $200 per house, or 2 per cent of the final selling price. This low percentage may be compared with the 15 to 25 per cent in automobile distribution, and the 35 to 40 per cent for distribution of most durable household appliances.

Although the house is a much larger item than an automobile or refrigerator and should, therefore, carry relatively a lower sales markup, its dollar costs for distribution are low even in absolute terms. It actually costs fewer dollars to sell a house than an automobile, and a householder pays almost as much for the marketing cost of an electric clothes washer and drier to go into his house as he does for the house itself.

At the same time that housebuilders have enjoyed these low distribution costs, they have succeeded in increasing the breadth of their market. Builders in the past have been sharply criticized for appealing only to a custom market and neglecting the mass market. Whether or not this criticism was justified in previous periods, it was not valid during the postwar housing boom. During this period, thanks to lower financing terms based on government insurance, the mass market was the most active market. In the San Francisco area in 1949, large firms aimed at this market with houses in the $8,000–$9,000 bracket and produced more than 45 per cent of their units for less than $9,000. The result of the improvement in financing terms and the concentration on production of lower-cost houses was that builders succeeded in reaching all of the top 70 per cent—by income—of the families in the area.[3] Within this range, houses are purchased in nearly proportional amounts by all income classes. This increase in the range, or breadth, of the market is not peculiar to the San Francisco Bay area. Most other metropolitan districts have produced houses at even lower prices and thus have reached an even higher percentage of the families in the $2,000–$3,000 per year income group (tables 39 and 41).

Although the housebuilding industry's performance appears efficient—on the surface, at least—in distribution costs and breadth of market, the third issue of merchandising—satisfaction of consumer wants—has been virtually ignored. There has been an almost complete lack of market information. In the San Francisco Bay area, neither individually nor as a group have builders made the effort to find out what buyers desired. Even the largest firms have been indifferent to market research.

[3] Based on a comparison of purchase prices of new houses in the last half of 1949 and the census distribution of families by income. The top 75 per cent of families had an income per family of over $2,800 in 1949. Bureau of Labor Statistics, *Sales Prices and Financing of New Homes in Four Western Metropolitan Areas 1949–1950,* table 5b; and Bureau of the Census, 1950 Census, *1950 Census of Population—Preliminary Reports Series PC-5, No. 45* (June 6, 1951), table 13.

No one knows whether buyers would have been happier with other designs or sites than those which they purchased. Selection of locations was made with such disregard of buyers' preferences that even in a boom market, some sites turned out to be unwanted. Sales cannot be interpreted as testing consumer taste because there is no way of knowing whether the houses offered really suited the tastes of prospective buyers, or whether the latter merely took whatever was offered because they were hungry for housing and could afford it, though preferring and ready to pay more for something different. When sales slowed down, no one knew whether the relapse was temporary, or what caused it; whether the builder had produced in a poor site, or from an undesirable design, or for a nonexistent sector of the market. Whatever the cause, the builder had lowered the value of his completed unit and endangered his own economic health. Without market analysis, he could not know why.

It seems obvious that performance would be improved if the industry would find out what types of houses are most needed and desired, and then plan its houses accordingly. Such market research would, of necessity, be expensive. It might be too costly for individual firms, since each covers only a small part of the total market. But market research could be conducted through builders' local organizations on a coöperative basis similar to joint-selling campaigns. With better knowledge of the market, better performance by all would follow. This sequence could take a variety of forms. For example, the knowledge of the types of houses which people really want could be applied to influencing people to fulfill these needs at the expense of other, less necessary, desires. The knowledge could be channeled into a campaign to increase house buying. Increased house buying might improve the welfare of the nation as a whole, in addition to that of the individual builder and the industry.

Speculate, for a moment, on the possibilities that might develop if housebuilders spent sums on advertising—influencing public taste and buying—comparable with the sums now spent for these purposes by the cigarette, beer, whiskey, or automobile industries. If, as many claim, too little is now being spent by the public on housing to achieve necessary housing standards and general well-being, then every dollar transferred to housing from some other less essential use would improve the national well-being. At the same time, increased expendi-

tures for housing might stimulate the industry's ability to produce better and higher quality houses more efficiently. If the increased demand for more and better houses was timed so that necessary supply adjustments could be made, it is possible that the cost of market research and advertising could be offset by lowered production prices.

Many observers would claim that such a theoretical possibility could not become a practical reality—that either it would be a wasted effort failing to stimulate demand, or, if effective, the greater demand would merely be met by higher prices and higher profits. Such skeptics would contend that the current convention of accepting the demand for housing as a given factor over which the industry has no control is more efficient. They would argue that performance would be lowered rather than raised by increasing marketing effort and expense.

A tolerant glimpse of the positive possibilities, however, reveals the fact that low marketing cost is not necessarily an assurance of high efficiency. Although the builder pays only slight sums for his selling effort, he receives only slight returns in market knowledge, and, therefore, uncertain returns in profits. It is questionable whether the minimal marketing costs really mean adequate marketing performance.

It is also questionable what breadth of the market represents adequate performance. Lack of data makes it impossible to ascertain whether the entire population should be included in the range reached by housebuilders, rather than the top 70 per cent—by income—as at present. No one knows whether the families in the lower quarter of the income distribution should be in the market for new houses. These are mainly atypical families, with partial or irregular incomes, many of them relief or borderline relief cases. It is possible that their living requirements and capacities would be better served by other types of dwelling units than new houses. It is further possible that the subject of their housing represents a problem for public concern and policy, rather than a market for the housebuilding industry. With respect to breadth, as in regard to costs, consumer needs, and other problems, the complete question of the market cannot be answered until more market knowledge is acquired.

The Problem of Profits

Study of the adequacy of the product and of the methods of marketing leads directly into a third aspect of an industry's performance—the problem of profits. Here the criterion is often expressed by the word

"fair." Is the industry making "fair" or excessive profits? A fair profit is a condition which exists in the minds of men and varies with each individual's personality, his position in the scheme of things, and the state of his purse. It is a condition which is rarely, if ever, defined. Moreover, relative profit data which would permit comparisons to be made are inadequate.

Profits are necessary to attract a capital supply for production, to insure continuation of production, and to make expansion possible. They serve as the reward for efficiency and for successful innovations. They are, however, suspect when they occur as the result of a monopoly or windfall.

There is need for some standard. Housebuilding may be inefficient if profits are too low, or unstable, thus failing to attract good management and necessary capital to the industry. Housebuilders have often complained that their industry was thus afflicted.[4] Housebuilding may also be inefficient if profits are too high. Experience shows that firms making windfalls, or high profits for other reasons, may waste large amounts of resources and may charge prices far higher than necessary.[5] The problem is that of the correct or appropriate level between high and low.

Although the pressure toward efficiency in our economy is composed of fear of loss and hope of gain, criteria for appropriate gain are not easy to apply. They occur in general terms and are not quantitative. Consequently, the commonest method of judging profits is comparison with profits earned at other times or by other firms. This may be the best approach for housebuilding. The profits of the postwar period may be compared with the profits in building's own past history and with the profits earned in other, similar industries, and a comparison may be made among various building firms at the present time.

These comparisons will allow some judgments to be made, though not completely accurate ones. In general, if the profits of building firms are low compared with firms in other industries, then one may judge that housebuilding's performance is probably high. Such a judgment, however, must be viewed in the light of the industry's own organization and history, and also in the light of comparison among similar firms at present—a light that may disclose inefficiencies.

[4] Ian Bowen, "The Case for Rationalization of the Building Industry," *The Manchester School of Economic and Social Studies,* Vol. XIX, No. 2 (May, 1951), pp. 170–189.

[5] Oxenfeldt, *Industrial Pricing and Market Practices,* p. 120.

Taking a look at the record (table 60), the history of construction corporation profits recounts much famine but little feast. In 1929, corporate profits were approximately 4.3 per cent of sales. By 1932, losses ran nearly as high as 7 per cent and continued through 1935. The peak year for profits in the 1930's was 1937, and then they reached only 1.9 per cent. In the 1940's, the story was different, of course. In 1943, for reasons of war, profits rose to nearly 6 per cent, and they reached 7 per cent during the years of our study, 1949 and 1950.

Comparing building with other industries, the percentage of gross income going to profits in construction companies has been far less than the percentage for manufacturing firms, and has been much less than the returns for all corporations combined. Perhaps more signficantly, in comparison with other durable goods industries that have experienced the same kind of sharp fluctuations as construction, the ratio of profits to sales volume in building has been lower. Corporate profits of construction firms have been only one-third to one-half those of the machinery and automotive industries in the postwar period. Because this comparison excludes nonincorporated firms in housebuilding whereas production in these latter industries is almost entirely in the hands of corporations, it may be that the disparity is actually larger.

The above comparisons of profits have been based on the profit percentage of sales. If a profit comparison were based on the profit percentage of owner's equity, the change in perspective would yield a different picture. Bay area builders received a return of from 20 to 25 per cent of their net worth in 1949, a slightly higher percentage of equity than was earned by manufacturing industries in general (table 61).

By way of statistical apology, it should be noted that all these comparisons are necessarily rough, because based on inadequate data, but they are probably of the proper order of magnitude, even if not exact in detail. Any errors are in the direction of understating the degree by which profits on sales in other industries surpass those of housebuilding and overstating the actual profits of the housebuilding industry.

These possible biases occur because profit data, both historical and current, have had to be based chiefly on corporate profit tax payments made to the Bureau of Internal Revenue, an unsatisfactory source for two reasons. First, Bureau statistics omit any distinction between

housebuilders and other types of builders and contractors. Second, and more important, their profit information is derived from the returns of corporations and omits unincorporated enterprises which form a large part of the housebuilding field. Only about half the total amount of housebuilding is accounted for by corporate returns, whereas almost the complete output in manufacturing and other industries is produced by corporations.[6]

Since it is probable that the two statistical inadequacies of this source work in opposite directions, the actual figures as reported by the Bureau of Internal Revenue may be a fair estimate of housebuilders' profits. On the one hand, housebuilding firms in the postwar period have probably been more profitable than other types of contract construction firms and, on the other hand, unincorporated firms have a lower profit rate than corporations. This well-recognized fact that unincorporated firms get lower profits was corroborated in our San Francisco Bay area sample, where a high correlation occurred among profit, size, and incorporation.

Analysis of the available figures indicates that builders' profits have been reasonable in comparison with other industries. Traditionally a competitive, low-profit, high-risk field, building has a past history of profits too poor for best performance. In the postwar period, when demand boosted housebuilders' profits together with those of most other industries, there is no evidence that the rise was excessive or out of line, particularly considering the greater risks and the longer years of the locust in housebuilding compared with the others. Total profits for housebuilding firms of all sizes in the Bay area in 1949, before taxes, were about $15,000,000 on gross housing sales of close to $200,000,000. Since this profit covered 17,500 houses, the actual profit per house sold in 1949 was about $845 (tables 11, 33, and 34).

Even higher housebuilding profits might have benefited the economy. Because outside capital is reluctant to enter the housing field, it is profits that permit firms to expand. Since increased efficiencies come with increased size of firm, sufficient profits to support expansion can lead to more competent operation and more and better housing for all.

Whereas returns on net worth in housebuilding are higher than profits expressed as a percentage of sales, these also appear not to have been excessive. Because of the large risk in housebuilding, an even

[6] United States Department of Commerce, *National Income Supplement* (Washington: U. S. Government Printing Office, 1951); tables 29, 31, and 16.

greater return on equity than the 20 to 25 per cent earned might have been expected. Builders operate with a high ratio of debt to equity, a hazard that would justify high returns on capital. Builders increase their risks to turn over their equity at a rapid rate, and this—despite the moderate profit per sales dollar—results in a relatively higher profit on their actual investment.

It is only when one turns from comparing housebuilding with other industries and with its own past history to a comparative study of profit distribution among Bay area firms that the profit performance appears unsatisfactory. Here, certain dangers in the present picture become evident. It is seen that in addition to the reasonable rise in average rate of profits as size of firm increases, exceptionally big profits both on sales and on invested capital were received by a number of large- and medium-sized firms. These facts probably indicate that the average efficiency in management for which average profits are paid falls very short of the efficiency of the best firms and that which might be prompted industry-wide by a more competitive market situation.

The present picture is explained by the existence of a profit "umbrella" which protects the efficient and the inefficient alike. The profit umbrella was raised by those two forces mentioned earlier—the push of powerful demand and the spread of easy credit. In 1949 and 1950, since houses sold readily if they had government guaranteed and insured loans, the factor which set prices was the appraisal policy of the Federal Housing Administration and the Veterans Administration.

The actual methods of appraisal followed a type of bulk pricing system. The price was set so that the bulk of houses needed for the market could be produced under average conditions with a "fair" profit. The set price allowed the average firm (a medium-sized one) a fair profit allowance over and above its necessary costs. In such a bulk-pricing system, firms which were more efficient than average because of larger size or better management had costs well under the price and made high profits, although less efficient firms crowded their price line and received a lower return.

On the surface, this looks like an equitable system because it expands the idea of a fair profit to include the possibility of higher reward for greater efficiency. Closer scrutiny, however, shows that this type of pricing may lower the total efficiency of the industry if the market does not put pressure on individual firms. Under the protection of

this profit umbrella, firms need not be really efficient but only as efficient as other firms to receive a profit. To be as efficient as the average firm may mean little because there is no guarantee that the average firm will be performing well.

This seems to have been true. The fair level of profits set to compensate the average firms did not require them to be efficient. The level and distribution of profits tended to retain in the industry a large number of small firms, plus many larger firms which had no prod to improve their performance. Large and efficient firms reaped much higher profits without being pushed to increase their efficiency, expand output, or substantially lower their prices.

If demand for housing decreased, making the market more competitive, this situation would change. Sales and prices would depend less on credit and appraisal and more on ability to sell at the proper price in the market. The general level of profits would fall. The least efficient firms would be weeded out. The potentially more efficient firms would have to realize their possibilities and cut costs to remain in business. Even the most efficient firms would have to bestir themselves, keeping down their costs and cutting their profits too. These cuts would, of course, accrue to the advantage of house buyers. If, on the other hand, demand were to rise still further beyond recent heights, and the prices people were willing to pay were reflected in higher appraisal levels, the "umbrella" would grow to shelter decreases in performance and efficiency, together with increases in profits.

The Dynamics of Demand

Housebuilding is one of the industries most immediately and intensely affected by changes in the general demand. Because the product is extremely durable and the existing stock is large compared with annual new production, a period of deflation will wipe out the demand for new houses, and the onset of inflation will stimulate demand more drastically in this field, in relation to normal new production, than in most others. That small shifts in the general demand cause tremendous shifts in the demand for the construction of new houses is dramatized by the facts that the amount of building required can fluctuate from almost zero to more than a million units, and that year to year changes of 300,000 to 400,000 are not uncommon.[7]

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[7] S. J. Maisel, "Variables Commonly Ignored in Housing Demand Analysis," *Land Economics* Vol. XXV, No. 3 (August, 1949), 260–274.

Flexibility is, therefore, a prerequisite to successful performance. To perform well, an industry must be geared to come to grips with the fluctuations which appear inevitable in our economy. In housebuilding, so especially sensitive to economic change, this is particularly true, since this industry's total performance is vitally affected by its flexibility in meeting demand shifts.

In this connection, ease of entry into the industry is also important. In the first place, flexibility itself is enhanced the more simple entry is made. In the second place, ease of entry improves the health and performance of the industry by providing the economic advantages which are normally associated with free competition. Monopoly cannot exist in an industry where entry is easy. In the third place, besides such economic grounds, there are important social and political reasons for applauding the ease with which new firms can come into being. Socially, it is desirable for the so-called small man to have a chance to become his own boss and rise in the world; politically, it is desirable that wealth be distributed rather than overconcentrated.

Housebuilding compares favorably with other industries with respect to these criteria. Entry is simple since initial capital requirements are low, resources are not restricted, and the amount of requisite investment in plant and equipment is negligible. The power of existing organizations is not of a nature to make others fear to compete. Even the legal requirements of licensing are minor. For similar reasons, expansion of output by existing firms is not difficult.

The record of housebuilding spells flexibility. The industry has been able to cope with its kaleidoscopic shifts in demand with as fluid shifts in production as have been accomplished by any other industry. It increased the number of dwelling units produced by more than 250 per cent in the periods 1921–1923 and 1933–1936; and from 1944 to 1948 the increase was more than 550 per cent. The industry experienced the largest production in its history in 1949, and still was able to expand its capacity by more than 40 per cent in 1950. There are few heavy goods industries which can lay claim to surpassing their peak production by nearly one-half in a single year, even under the forced draft of a war or a defense program (table 4).

Figures to define ease of entry are equally plain. Between 1940 and 1950, the number of firms engaged in construction on the national scene increased by 85 per cent. This was almost three times as great

an increase in participation as was experienced by any other industry. This rapid growth nationally was reflected in California, where the number of licensed contractors nearly doubled between 1945 and 1950, and the number of active firms probably increased somewhat more (table 62 and sources cited therein).

This spectacular expansion was made possible by the inherent factors listed above. Because little expensive equipment is required, and working capital is replenished by customers or lenders after work has begun, the financial resources of most individuals with experience in building and a will to become independent are sufficient to start a contracting firm. The small builder can almost literally start on a shoestring—or, at any rate, on a single set of tools—if he uses his own home as a base of operations, does his own record-keeping, and holds all fixed expenses to the minimum. Although a house is a complex product, so many of the tasks involved in its construction can be performed by subcontractors that most problems of recruiting, training, and maintaining a work force are eliminated. Product development, sales effort, and other such costly functions can be omitted. The entrant need not be an innovator, under present market conditions. He needs neither wealth nor imagination but just a little knowledge of his craft. In California builders must be licensed, but the requirements of four years experience and ability to pass a fairly easy written examination are not onerous. The small-scale entrant is reasonably safe; he can revert to his former status without much loss if things go badly or build up his firm if things go well.

In addition to entering the industry with ease, builders of all sizes can increase production easily and rapidly. Expansion can occur with little increase in the overhead per unit. Housebuilders are not hampered by the bottlenecks in fixed plants and equipment which hold back other industries. Simple overhead structures and low capitalization permit as flexible an increase in production as demand invites. It is true that most newly formed building proprietorships feel some discomfort from lack of capital, but these disabilities can be overcome by partnerships or by pooling of the capital of several investors; and when earnings are good, the capital shortage need not last long.

In the postwar period, when housebuilders bought supplies at rapidly rising prices, they themselves were rapidly increasing in scale—and with increased scale, they could lower their internal cost curve so

as to offset some of the higher supply prices. Housebuilders have sufficient opportunity to substitute among their factors of supply so that they can increase flexibility from those sources also.

This pattern of flexibility and the ability to cope with problems of factor supply were especially visible in relation to labor. The number of workers employed in construction dropped from 1940 to 1945 and then more than doubled from 1945 to 1950. In the San Francisco Bay area, the number of workers employed in construction increased by more than 100 per cent from 1940 to 1950 and by 25 per cent in 1950 alone. During the peak of expansion, labor was scarce in particular trades, but because of builders' substitutions of skills and materials, the labor shortage did not form a bottleneck (tables 57 and 58 and sources cited therein).

At the same time, efficiency wages were rising. While wage rates were increasing at about the average rate for the economy as a whole, wage payments tended to rise faster for the builders, because the new men coming in at the new wage rates were less skilled, and the more skilled men obtained bonuses above the union scale. In addition, there was a general fall in output per wage unit because of the individual slackness that normally accompanies noncompetition for jobs in an overemployed market.

Despite the impediment of a labor supply which was hard to get, cost more, and produced less, the flexibility of the industry enabled it to reduce actual labor costs. This was done by changing the process of production through use of specialization and mechanization so that more actual output could be obtained from a man, though his skill and desire to work were small.

A comparable change is less visible in relation to materials supply. The wholesale prices of building materials rose by nearly 100 per cent from 1945 to 1951, compared with increases of about 66 per cent for prices in general (table 56). Housebuilders were able partly to offset this relative rise by changes in the channels of distribution, and somewhat by certain substitutions among goods. It is not clear whether their flexibility enabled them to offset the total rise, however. The fact remains that though their factors of supply rose more rapidly than prices in general, housebuilders held increases in construction costs during the postwar period to about the same rate as wholesale prices in general, and thus to a slower rate than that of the supply factors.

Besides labor supply and materials supply, a third major factor

affecting expansibility of housebuilding firms has been money supply. It has been seen that financing was not a critical problem in terms of firm equity, but it was necessary to have adequate financing for the final sale. During most of the postwar period, there were sufficient mortgage funds available to take care of the industry's need for expansion. At certain times, however, mortgage funds became temporarily scarce, and on these occasions, the industry had difficulty in adjusting. Absence of mortgage money can be a serious impediment to sales.

The other cost factors have, on the whole, been flexible. With the ease of adding to overhead for both builders and trade contractors and the economies inherent in larger scale, expanded production brings greater overhead efficiency, in striking contrast with those industries which have fixed plant and overhead costs. When these other industries reach their limit of expansion, their costs shoot up almost vertically because of lack of flexibility.

Sufficient flexibility is good, but it also may pose difficult problems. With a high rate of entry, there is also a high exit rate. Men may be attracted to the business simply through the hope of making a rapid dollar, and may run out just as fast when the promise glimmers. During their period in the industry, they are not interested in performance and do not add much to the industry's reputation. At the same time, since many elements in ease of entry increase risk, they may deter sound businessmen from taking advantage of it.

Another deterrent is the difficulty of investing in research and similar activities which require some type of protected market for amortization of the investment. In housebuilding, even if a firm makes an important discovery in processes or techniques, its share of the market is so small that its gains from its discovery may be small and only sufficient to pay for a fraction of any expenses incurred in making it. This disadvantage of ease of entry suggests that if the familiar Schumpeterian thesis of the importance of monopoly gains can be applied anywhere, it is here.

Housebuilding meets fluctuations in demand with good performance, but would not performance be still better if housebuilding were so organized as to halt the fluctuations? This question could receive a realistic answer only if a way were found for the industry to level out the changes in demand. The difficulty is that the waves of demand are impelled by external forces.

Some might suggest that increased size and overhead would help housebuilding firms to overcome the ebb and flow of demand. Although the risks of fluctuations tend to hold down the overhead size, there is no indication that additional size of overhead would diminish the fluctuation processes. The fact that steel or auto companies have had large overhead plants has not lessened their output fluctuations, but has only augmented their financial difficulties.

Suggestions have been made that housebuilding fluctuations might be diminished by a more flexible price policy. But there is no evidence that additional demand would result from lowered prices. Price elasticity does not appear to be great. Houses now are a necessity within the purse reach of most families. Even if firms attempt to lower prices, their ability to do so would be slight because only a small percentage of the final price returns to housebuilding firms. Flexible price policies are possible primarily when firms can change their products so as to reduce production and factor costs or their share of the final price to an extent not possible for housebuilders. And furthermore, flexible price policies might have an effect the reverse of that desired. Since a house is a durable object which can easily be stored, buyers and speculators might attempt to anticipate price changes, thus accentuating existing fluctuations.

Since fluctuations are largely due to forces outside the industry's control, the most feasible methods for lessening them would also appear to lie largely outside. Stability might be improved through a shrinking in the fluctuations of national income, and perhaps through the setting up of some type of guaranteed housing market with government support. This latter possibility, which appears best, would depend upon the trend of industry-government relationship. Until recently, it appeared probable that some type of increased demand during depressions would be forthcoming from government sources. Now it is not as evident. In any case, these problems are those of the performance of the economy as a whole. Housebuilding appears to have done its share in meeting the fluctuations in demand which have faced it in the past.

Efficiency

The problem of efficiency has already been dealt with at length. It is recognized that good performance in this field consists in an increasing

productivity ratio (output over input) over time, together with a proper utilization by industry of the potential changes in productivity available to it. These changes, of course, may lie within the province of management or they may depend upon developments in some other parts of the housebuilding organization.

The growth of efficiency in housing has followed four separate paths. First, there has been a general increase in mechanization and improvement in the techniques used at all levels. Second, cost reduction has been achieved by the moving of a larger share of production off the site and into plants, where lower costs are possible through better controls and deskilling of labor. Third, cheaper financing and easier selling have made savings possible. Fourth, the greater specialization engendered by increased scale has cut costs.

All builders have introduced greater mechanization into their construction process. Small power hand tools have been perfected and used for an increasingly large number of operations, thus cutting down the units of labor required. At the same time, more attention has been paid to the efficient planning of the entire construction process, with even the smallest firms attempting to use procedures and techniques with the lowest costs.

The pushing back of the production process from the site into the mill or factory has meant that many assemblies formerly produced by craftsmen with hand tools are now manufactured under factory conditions and arrive at the house in a nearly finished state. Steel and aluminum windows, complete with glazing and screens, are a good example of this type of item. In addition, the use of more completely finished materials that are simpler to install has increased. The advantages of dry walls and tile floors fall into this category. The result of these changes has been to make the builder increasingly an assembler rather than a fabricator. At the same time, the amount of handwork, and with it, the amount of skill required, has been reduced, with a consequent increase in efficiency.

There has been a change for the better in the field of financing since the prewar era, when all studies stressed the poor financial condition of builders. For example, *Housing America* estimates that during the 1920's financing made up more than 20 per cent of the final costs of a house,[8] and builders were believed to be dependent on their suppliers

[8] Fortune, editors of, *Housing America* (New York: Harcourt, Brace & Co., 1932), pp. 67–68.

for credit, thus paying higher prices. In earlier periods, the financing cost was so high because buyers and builders had to pay exorbitant fees to obtain necessary financing, frequently through the use of junior liens.

In contrast with this, financing made up only about 2 per cent of the cost of houses in 1949 and 1950. The saving was realized in lower costs for the final consumer financing, more available construction credit, and lower payments to suppliers. Improved financial position enabled builders to realize additional cost reductions because they were no longer dependent on their suppliers for credit and because the hazards of liens, failures to carry out contracts, and steps aimed at avoiding such failures were all reduced. With improved capital conditions, the industry simplified its credit structure and problems.

Finally, there are savings due to the increase in the size of builders and their assumption of responsibility for the complete housebuilding process. The rapid increase in demand which characterized the war and postwar periods became the most powerful force behind the industry's progress. And this progress manifested itself most significantly in the strong trend toward merchant building and the concentration of production into the hands of large firms, run often by shrewd successful businessmen exploiting a new mass market. The largest firms employed 40 or 50 people spending full time on management and executive functions—a far cry from the small firm whose owner performed all overhead duties himself in his spare time. Managements of this size can enjoy the benefits of specialization within themselves and have been able to evolve better financing and land development methods as well as production techniques. The improvements and cost reductions realized through bulk purchasing and better relationships with subcontractors have already been stressed. Most important of all has been the greater degree of rationalization of the production process.

"Rational" organization of the work force tends to be self-reinforcing. Specialization leads to greater efficiency and increased volume which, in turn, make possible the use of more repetitive and routine operations. Increased mechanization begins to pay dividends as tools can be kept in more constant use and their cost per unit of output falls. Inclusion of standardized product elements, such as precut or preassembled components, becomes more feasible with expanded output. Standardization, too, allows extensive employment of patterns

and templates and various work-holding or work-positioning devices to reduce work effort. At the same time that direct productive efficiency is increased, the opportunity arises for more effective use of the supervisory force through tighter job scheduling, decreased necessity for direct supervision by major executives, and higher worker-supervisor ratios. Last, but not least, it becomes worth while to utilize more rigorous accounting procedures in conjunction with other management controls (such as production and inventory controls) so that costs are known in the fine as well as the gross, so that cost standards can be set up, and so that concrete information for making decisions is available.

Although not all these changes are measurable, they have meant important improvements in efficiency. It is probable that as a result of changes in the production process, the efficiency in the use of direct labor by large firms was at least a third higher than that found in the average housebuilding firms of the prewar period. Such an increase in labor efficiency means that improvements in the housing process during this period probably compare favorably with those in other industries. If the estimate of *Housing America* was approximately right, there was an additional decrease of at least 15 per cent of the total cost simply through improved financing. Finally, since at the start of the decade of the 1940's few, if any, large firms existed, an improvement in efficiency must have occurred at least equal to the 6 to 12 per cent reduction in costs which resulted from larger scale.

These four lines of efficiency growth demonstrate increased efficiency over the past, but they do not show whether or not housebuilders are actually using their existing potential to the fullest extent. They may be efficient compared to their own past performance, but inefficient compared to other industries or to their own possibilities. Such inefficiency appears particularly acute in management, which remains one of the weakest parts of housebuilding performance.

The growth in size of housebuilders brought about far less improvement in management than might have been expected. The average firm is still not run efficiently, and the contrast between good management and average management in every size class is great. Perhaps this lag is not surprising in view of the rapid and incomplete transition just gone through by many housebuilding firms, which mushroomed from businesses spending next to nothing on management to opera-

tions requiring and able to afford a high degree of managerial skill. The development was so rapid that it was next to impossible to meet the requirements for good management. Not only was there a shortage of men with the necessary knowledge and talent, but the executives of the rapidly expanding firms were primarily concerned with entrepreneurial problems. They frequently did not have either the time or the necessary background and organizational skills required for efficient operation of their firms. Furthermore, no external impetus toward better organization was provided by competition during the period, and consequently, development has been slow.

The greatest management weaknesses seem to lie in the realms of cost data and research and in a failure to reëxamine the over-all problems of the organization and functions of the firm.

(1) Perhaps most important has been the failure to develop adequate record-keeping and methods of production control. Management has remained on a very personal basis. Scheduling has been too often hit-or-miss, and knowledge of what actually occurred during the production process has been haphazard and loose. Many of the advantages of specialization, which firms in other industries are quick to exploit, have been neglected through inertia and ignorance.

Weaknesses of this kind in management are difficult to measure. Since no two industries function alike, interindustry comparisons are suspect. Our belief that housebuilding has proceeded only part way toward comparative management efficiency is based not on an ideal borrowed from other fields, but rather on comparison among building firms in the San Francisco area. Even among the big firms, wide differences exist in methods of planning, controlling, and supervising production. The majority had no adequate cost accounting or production controls. As a result, their efficiency was lower; they received less output for their labor expenditures and wasted more of other production items than the few firms with better management.

Housebuilding firms have accurate records of their total costs, but have failed to break them down to show the costs of specific parts of their operation. Many examples can be found where builders in the area have not known whether or not they should adopt a specific technique because they had no way of comparing relative costs. Consequently, many innovations are adopted only by those with the best information and may later be copied by others if they appear to bring about savings.

(2) Related to this lack of knowledge about costs has been the failure of firms to reëxamine their complete job organization and to introduce new methods and materials. It is true that large builders have emphasized standardization, simplification, and the logic of their production processes to some extent, but on the whole, the field has received far less attention than is its due. If builders knew more about their actual costs in terms of components and individual sections of the house, as compared with their present knowledge of what they spend for materials, labor, and trade contracts, they might find it advantageous to modify and revamp their whole construction process to a great degree.

New procedures have been developed in the most efficient firms, and it is probable that, in time and with more intensive competition, more effort will be made to develop management skills by all firms in the industry; otherwise, many may fall by the wayside. If the gap can be closed between the best-run firms and the average firm, the entire efficiency of the industry will be greatly improved. More important even than the acquiring by inefficient firms of the techniques already in use is the development of new management methods and skills by all.

The obvious reluctance of large firms to increase their overhead has been a major drag on progress toward better management. Expanding overhead has meant taking additional risks, which firms have naturally been hesitant to do unless forced by competition or led on by hopes of much larger profits. Unlike many manufacturing industries, where expanding firms can find already developed successful techniques to incorporate into their own overhead, housebuilders have no assurance that money spent in expansion will not go down a rathole. Until more firms make concerted efforts to develop better methods, progress will remain slow.

Progress

The final—and, to many, the most important—criterion of performance is progress. The whole economic history of the United States is characterized by giant increases in productivity, with even average industries developing new methods and better technology at a rapid rate. Simply to hold its place in the industrial scheme, an industry must show constant improvement.

Builders have not closed the door on progress in the past decade. They have shown great willingness to adopt methods proved by others. When techniques have appeared promising, they have spread quite rapidly. A fair percentage of builders, though perhaps not the average, has made an effort to keep abreast of current developments through the technical press and their trade associations. A certain number of builders have experimented with new techniques, and if they were successful, the use of the innovations has become widespread. The rate of progress in recent years has been greatly accelerated over that of the past. Even so, this progress has primarily taken the form of more skillful performance of the same traditional housebuilding processes.

Innovations, or cost-reducing or output-increasing changes, can come about in a variety of ways. There can be (a) an introduction of a new method of production involving changes in the manufacturing processes or their organization; (b) discovery or creation of a new market for the industry's output; (c) development of a new source of supply or factors; (d) creation of a new product or a significant change in quality of existing ones; and (e) a change in the industry's organization or distribution methods.

Examining the record of the housebuilding industry with respect to this list, and especially comparing it with the record of other industries, one is struck by the relatively unchanging nature of its product, processes, and organization. Perceptible changes have taken place both in the construction process and the product it has evolved in the Bay area in recent years, but they have not been revolutionary.

This conservative record is disappointing to many observers, whose minds have long pictured the rosy possibility of a suddenly different and radically better housing industry. They feel that it has missed a great opportunity, seized by many other industries, to live up to its own potentialities, to introduce dynamic changes, to take the large view. Ford revolutionized auto-making. Where is the Ford of building? Many candidates have come forward seeking this honor; why have they failed?

There are two possible explanations for the stability and relative lack of progress in the housing industry. The first is that possibly the most efficient firms, using present production methods, have already brought the cost per unit of output as low as it can be with existing knowledge; that further reorganizations, changes in factor use, and

other innovations would not actually bring about a sufficient cost reduction in the final unit to justify the upheavals attendant upon instituting them. The second is that, assuming there is ample room for real growth in efficiency, no one has had the vision to perceive in what areas changes should be brought about; or, if they have such insight, have not had sufficient influence or strength to bring them about within the existing organization of the industry. In terms of the earlier analysis, there is some scale of firm that is far more efficient than the present optimum size, but it cannot be reached because of the intervening, less efficient size ranges, which a firm cannot push through without being given a strong shove by some external force.

Those who hold the first view claim that the present structure of the industry, with its small overhead, great flexibility, and low profits, is efficient, and that the production process is better than most critics realize. Wood is basically an efficient material, cheap, easy to handle and to work with. A wood frame has great advantages over other materials. A competent large firm can complete the shell of a $10,000 house, including foundation, subfloor, framing, siding, and roofing, for less than $2,000—a figure extremely difficult for other procedures to compete with.

Those adhering to the second point of view, however, maintain that this appearance of efficiency is an illusion, and that the cheapness of the frame of the house is deceiving. Builders comparing other methods of production find that they cannot beat their present framing costs, and, therefore, continue as before. They ignore the fact that the big expense of a house is the equipment and finishing, which are purchased from subcontractors and do not enter the picture when the builder calculates new methods. Efficiency can be increased, but only if someone takes an entirely new view of the complete building process, looking toward elimination of some of the present steps rather than continuing merely to develop gradual improvements in the present methods of performance. A radical shift in the method of production (the production function) is called for.

The proponents of this second explanation have, on the whole, held that a basic prerequisite to important shifts in the production function is probably that firms much larger than those of the present must come into existence in order that the potentialities for new production methods can be perceived and brought about. Connected with this

belief is the idea that the housing industry is too competitive to operate efficiently. Those who advance this theory state that, contrary to most industries, housebuilding has suffered because of a lack of firms with a monopoly position. Firms are required which could furnish leadership, understand the need for change, undertake necessary research, and introduce radically new methods that would achieve greater efficiency. The present state of housebuilding, characterized by intense competition, diversity of organization, extreme flexibility, and an unstandardized and complex product, is not conducive to the development of such firms.

The excess of competition, it is claimed, leads to a general absence of money for research and a consequent following of a one-at-a-time approach which fails to encompass the building process as a whole. It is claimed that many of the factors which make entry easy tend at the same time to slow down innovation. Where entry is too free, industry members may undertake few departures, realizing that new entrants will adopt them and their favored position will be "competed away." In addition to possible rapid erosion of profits of innovation in an easily entered industry, there is a strong possibility that firms may find it hard to accumulate funds to finance the research from which new products or new methods of production can stem. Lacking firms with a protected position, the industry requires either an outside force, such as aid through governmental policy, or the emergence of an entrepreneur with unusual ability, drive, and luck to achieve any important changes in the production function.

The present relative inertia of housebuilders is not illogical. When comfortable profits can be made by being only as efficient as the bulk of the industry; when the nature of the product is still largely dictated by common acceptance of an indifferently designed and executed product; when any one producer controls only a small part of the industry output and not all the processes of production; and when concurrent innovation is lacking in supplying industries, the urge to innovate is weakened. When, further, introduction of new materials or methods of production must be pushed past stiff institutional resistance, the prospective net gain of innovation appears small.

The argument for larger size and greater monopoly in housebuilding is also advanced on the grounds that the present relationship between housebuilders and the suppliers of factors is unsatisfactory.

This line of reasoning follows partly from the belief that monopoly is widespread among the supplying industries. It was brought out earlier that this is far from the case, but it is true that whatever restrictions the industry does feel might be reduced if housebuilding firms enjoyed still greater bargaining power. Perhaps, too, though no single source of supply of a necessary factor has been able to hold back progress, the cumulative effect of all factors may have been to discourage builders from upsetting the status quo. A builder might be willing to battle a labor union or a code authority to adopt an innovation, but would shrink from arousing the combined opposition of all his suppliers, including labor, materials, codes, and financing institutions. If he is making adequate profits, he would probably lack the necessary drive to attempt any such total innovations.

In opposition to this idea of housebuilding's difficulties arising because of too much monopoly on the supply side, the problem may be one of too much fragmentation leading to the same lack of progress noticed for builders. Since no one supplier furnishes a preponderant amount of the total product, none is moved to look far beyond his own immediate interest, and thus no impetus toward improving the over-all performance comes from this source. Technical research among the supplying industries, as well as among the housebuilders themselves, may be lagging. In lumber, for example, almost the only research has been conducted by the government. In codes, where the government has the main responsibility, the lack of knowledge is almost complete. Only recently has the rate of development of construction machinery accelerated. Other material industries show similar lacks.

If, however, depth were increased and the entire process from raw material to finished house were controlled by a single firm large enough to integrate all parts of the production process, any disadvantages due to either too much monopoly or too little cohesion in the factors of supply might be offset. In theory, such a firm could be run by a management capable of planning the entire process in the most efficient way, and it could succeed in combining and streamlining the many diversified actions now taking place. Although belief in this type of advantage has been advanced by many, in the actual development of the industry to date, no concrete advantages of this type have appeared. The theoretical benefits of better management and stepped-

up research and development programs have yet to be seen in practice. Nor has integration proved to be more efficient. In contrast with these illusory advantages, the greater risks and higher marketing costs attendant on increased scale are clear and ever-present.

Experience alone can prove or disprove the arguments of those who propound the necessity and possibility of revolutionizing the industry to achieve greater efficiency. It is impossible to combat an assertion of what might be that is not based on existing facts. Time may bring about radical changes; the fact that it has not as yet done so cannot prove or disprove the possibilities for the future. All that can be done is to look again at experience and try to see what hints it may hold.

In view of the facts that, with current housebuilding procedures, further increases in scale carry with them as many drawbacks as advantages, the main opportunity for increased efficiency would seem to lie in more rapid technical progress with the existing organization. Here, the lack of faster progress may well reflect the state of the product and the market structure of the industry. The materials used by the industry have developed over a long period of time and are efficient. The fact that they are produced and consumed primarily in competitive industries may, however, be hampering faster development.

The history of attempts at innovation in housebuilding in recent periods is extremely interesting. Attempts have been made to develop modern production methods, some of them backed by the resources of the country's largest firms. They have failed, primarily because other materials, more suitable for mass production, have difficulty competing on a price basis with wood. Increased production efficiency has not been able to offset increased material and overhead costs. This has been the experience both in England and in the United States.[9]

On the other hand, where funds have been available in the supplying industries, important improvements have been made. In some of the specific parts of the house—for example, in interior walls, window casements, and certain types of flooring—new products have been developed. Individual firms supplying these products had a sufficiently protected position to recoup their costs of innovation. In parts of the house constructed from materials produced by the less oligopolistic

[9] Cf. Kelly, *The Prefabrication of Houses;* Herbert G.Heavenrich, Jr., *Housing in Great Britain,* mimeographed (Cambridge: A. F. Bemis Foundation, 1952).

industries, improvements have, on the whole, resulted primarily from governmental research. Examples may be found in work on plywood, nailing, lumber strengths, plumbing, and work methods. These are areas in which no individual firm has had the interest to attempt research on the necessary scale, and even firms much larger than present-day ones would not be of sufficient size to undertake it.

The type of results that have been obtained to date may well indicate what progress to expect in the immediate future, given the structure of the housebuilding industry and of the lumber industry, its chief source of material. Individual firms, limited in their scope, can continue to perfect their own individual skills, particularly in the production process and in design. Their suppliers can continue to improve their products and to develop new machinery. But work on major innovations in the over-all structure of the industry is beyond the scope of individual firms and may well depend on the organization of some kind of coöperative efforts among housebuilders and on government leadership.

In fact, the encouragement of some type of joint research is probably a much more logical basis for bringing about growth in efficiency than is promoting expansion in the size of firms. The latter means is fraught with uncertainties, involving as it would the replacement of the present known advantages of easy entry and free competition by monopoly. It is an indirect route, which might lead to greater inefficiencies in other spheres than would be justified by the results of the research it might make possible.

On the whole, the organization of the housebuilding industry and the institutional setting in which it operates do not appear to be conducive to rapid change. Some of the very factors that make for ease of entry militate against further dynamic behavior, and some of the developments that make for safety of enterprise (e.g., spreading risk by trade specialization) also make for limitation of enterprise. The industry has not reacted readily to suggestions for change, perhaps in part because many of the changes advocated have been put so broadly that industry members cannot evaluate their worth. The ideas for a completely reorganized and different industry probably fall in this category of not being feasible, even though they cannot be ruled out completely. There are too many lessons from other fields to allow anyone to scoff at those who believe they have found new solutions of

the building process. Granted the possibility of rapid change, those who believe in it must still explain why it has not occurred, and it does not appear that they have succeeded in making such an explanation. There is no indication that the persistence of existing methods is not simply a victory of the most efficient means in a competitive market.

11

The Future

Bases for Change

It requires not merely self-control but a break with tradition to conclude a study on housebuilding without prescribing a procession of panaceas which, if taken, would quickly cure all the housing ills of the economy. Since this study has shown that the housebuilding industry still has before it broad opportunities for betterment, a parade of alluring short cuts toward a happy and easy solution might seem called for. Unfortunately, such an optimistic pursuit of the future would run counter to all the body of facts which the statistical method has marshaled. These painstakingly gathered data teach that progress in housebuilding, as elsewhere, must make haste slowly, with knowledge and wisdom.

Housebuilding is in transition. The many forces whose ferment has formed the industry's past and present are at work determining its shape in the years immediately ahead. These years hold out hope for far greater progress than has yet been achieved. Although the housebuilding industry has made a better showing under postwar pressures than its critics will concede, its accomplishments are still not up to the peak which its advocates boast. There are yet higher levels of performance within its grasp. These levels will ultimately be attained. The immediately challenging questions concern the way in which they will be attained, and how soon. There is a broad range of possibilities as to the form and pace that change will take, based on the existing situation.

With its flexibility and freedom of entry, housebuilding remains one of the prime strongholds of free competition in the economy. Although the impact of a tremendous demand for housing on an initially limited supply did allow some firms to reap large gains and did decrease

efficiency, it did not result in exorbitant profits or in money squandered on extraneous selling costs. Such facts indicate the pliability of the industry. At the same time, the rate of product improvement remained slow, and the quality of the product may actually have deteriorated. Management, on the whole, was deficient. The amount of research, either basic or applied, was almost nonexistent in the industry itself. Technological advances in housebuilding appeared to lag behind those of other industries.

It is this fitful and uneven development which characterizes the recent past and present—the situation from which future progress must, of necessity, evolve. In the process of transition from small contractor to large merchant builder, change has not always been synonymous with improvement, even to the extent of fulfilling existing possibilities. Houses are still expensive and performance is far from optimum.

In this picture of erratic advances and missed chances, there is no hero and no villain. Some of the good and some of the poor results must be charged to each of the main determinants of performance. For example, the large increase in demand strengthened the production process, but removed many of the penalties of inefficiency. The durability of the product and the variety of markets required industry flexibility, but radically limited the organization potentials available to individual firms.

Housebuilding management has been far from distinguished. Although the greater concentration of production into the hands of the larger firms brought improvements over the past, management is still weak in production knowledge, marketing skills, product development, and over-all planning and control.

The influence of the factors of supply has also been inconsistent. The housebuilding materials industries made faster technological progress than the builders, but were slow compared with other fields. Although monopolistic controls of materials in the aggregate do not exceed those of the rest of the economy, there are areas where restrictions hold prices higher than necessary. This is true, also, of the labor supply. The very fact of the great diversity of materials and labor required has been an additional impediment to progress.

The government, too, has offered mixed blessings. Although much progress in developing mass-production methods resulted from the

easier credit brought into the market by the government, little consideration has been given to the effect on prices and on builders' efficiency of the insuring policies. The present appraisal system is not devised to facilitate the improvement of either the quality or design of houses; in fact, it probably penalizes builders who attempt innovations along either line. The government's credit programs have suffered from general ignorance—an ignorance compounded of gaps in information and poor use of information. Likewise, building codes have been a problem, not because of the failure to adopt model ones, but because of lack of knowledge for improving the models.

Forces Promoting Change

The many groups of people at work in the housebuilding industry can accelerate the pace of progress if they see their goals clearly and arm themselves with sufficient knowledge to win their chosen objectives, or they can seriously retard the rate of transition if they remain bogged down in ignorance and petty detail.

Too many prescriptions for progress in the past have been founded on hope or faith rather than on facts as to feasibility. Any planning for the improvement of the housebuilding industry must be based on sound knowledge as to its practicability.

Along what paths does progress appear most possible? The most likely lines for improvement lie in the direction of better management and more attention to performance and to industry organization. Intensified competition may be a key force.

The role of housebuilding management in the transition toward greater efficiency is a crucial one. It was only in the recent past that management skills and talent became significant in housebuilding. Previously, management's sphere of action was so limited that lack of ability made little difference. More recently the growth of the large-scale merchant builder has made management the driving force of the industry. Progress will be slowed or speeded, depending on the development of the large builder's capability and vision.

Improvement of management can move on a double front—the production process and performance itself. Management can push forward toward greater efficiency in the production process, not only by utilizing the accumulating experience of the large housebuilding firms but also by acquiring usable knowledge from other industries and

applying it to housebuilding. Management can raise its whole achievement level by concentrating more attention on those performance aspects which were neglected in the postwar boom when firms centered on increasing production and profits. Although the housing shortage may have made maximum production a suitable goal for performance during that period, such aspects of performance as quality of product, the market, and efficiency will have more weight in the future.

Builders can face the future with more security when they have worked out the problems of the over-all organization of their industry, as well as the structure of their individual firms. With the industry remaining a conglomerate of competitive firms of all types, there will be opportunities for progress which can be grasped only by the industry as a whole. More coöperative action among firms appears both necessary and probable. In addition to strengthening their own operations and their bargaining power vis-à-vis their suppliers, builders through coöperation may expect to increase their influence on government policy. The trend is already apparent and may be expected to become an important area of action in the future.

Looking at the possibilities of industry bargaining power vis-à-vis its suppliers, it is conceivable that builders can help themselves by taking some initiative in stimulating improvements in the factors of supply to housebuilding. Any progress in the supplying industries would, of course, aid building. Given the existing structure and problems of the supplying industries, the extent of the important changes they will make on their own volition may be limited. These suppliers operate in accordance with their traditional part in the economy of a free enterprise system, and appear no better and no worse than the average industry. Progress at an average rate may be expected of them, but any more rapid change would need to be at the instance of the builders probably operating through their industry organizations.

Looking at the relationship between the industry and the government, it is clear that the federal government, especially in recent years, could make or break progress in housebuilding. In many cases its actions have been ambiguous. It has had too little concern with the effect of its actions on competition or performance. If progress is to go into high gear, the government must develop more logical and consistent policies than in the past, and must consider more carefully the

results of its actions.[1] There are also wide areas for possible action not yet explored. Many areas where builders cannot possibly succeed as individuals, such as in production for atypical markets or for periods of depression, may be possible with government coöperation.

Closely related to the question of government policy is the problem of the market. The market was, of course, abnormal in the postwar period. Builders had no occasion to compete for sales; if houses could be built, they could be sold. No one was taking another's market. Such competition as existed was among buyers. This extreme demand was modified by 1950 when the supply began to meet the need. Once again builders had to worry about sales. Firms which had increased their volume and capacity had to seek sales in a more limited market. If normal conditions return to the housebuilding market, this acceleration of competition is likely to be the most potent single pressure in the near future.

Although all these forces will probably be important in an evolutionary way, there is no sign of a development apt to produce a revolution in housebuilding. The generally diverse conditions appear likely to continue for the immediate future unless an entirely new technical situation develops. The history of radical innovations indicates that they cast their shadow before them, and no prefiguration in the existing situation hints of sudden or extreme change. For a drastic force to be effective in the near future, it would have had to spark already, since the interval from drafting board to actuality is long. Likewise, it appears improbable that there will be any snowballing effects of change through tremendously increased scale. Housebuilding is not geared to develop huge firms. The same factors which have put a ceiling on the size of the largest firms continue to exist. In general, improvement will depend upon continued development along existing lines.

The Scope of Change

If progress proceeds along the lines indicated—toward better management, better performance, and better organization of the industry—what may be expected in terms of net results? These may be summarized as a change in the size distribution of firms, an improve-

[1] Cf. Leo Grebler, "Stabilizing Residential Construction—A Review of the Postwar Test," *American Economic Review* (September, 1949), pp. 898–910; and S. J. Maisel, "Policy Problems in Expanding the Private Housing Market," *American Economic Review Proceedings* (May, 1951), pp. 598–611.

ment in product and in marketing methods, increased research, a shift in profit rates, and probable advances in production processes.

With respect to size distribution, a more rapid polarization of the industry into large merchant firms, at one extreme, and small contractors, at the other, may be expected. The industry is still highly heterogeneous in sizes and types of builders, all in sundry stages of development. More vigorous competition should speed concentration at the two poles. If the housebuilder's evolution follows a survival-of-the-fittest pattern, many medium-sized firms, unable to stand the test of a stabilized or decreased demand, may become extinct.

The survival of competent small contractors seems unquestioned, not only because of their enduring role in the custom market, but also because of their potential role in the erection of prefabricated structures on scattered sites. For example, many small contractors might operate on houses designed, precut, and delivered to scattered sites by the large firms, with subcontracts handled by a constant group of trade contractors who would perform the same work for various small contractors. Such an operation would combine the advantages of both the large and the small firm, for the small firm's problems of purchasing and design would be solved through a central source, whereas its greater flexibility, lower overhead, more efficient labor, and better quality control would continue to offset many of the advantages of larger scale.

Survival of the large merchant firms is an obvious evolutionary certainty, since increased scale represents housebuilding's adaptation to the economy. Certain big building firms are likely to grow somewhat bigger than they are, but an octopus-like development—concentration of the national market into a few hands—appears improbable, at least in the near future. The prospects are rather that in most metropolitan areas a few large firms will take over more of their local markets, under the pressure of greater competition and more stress on efficiency. No single firm, at present, has a maximum share of more than 4 or 5 per cent of its local market. In the San Francisco Bay area, large firms offering a superior product made with more efficient methods will be able to double or triple this percentage, and, in addition, to hold a similar percentage of several adjacent markets. This will mean fewer and larger firms. A likely possibility is that the San Francisco Bay area, instead of having more than 100 large and medium firms with an

average output of 90 houses each, as in 1949, will have only 20 or 25 such firms, with an average output of 400 or 500 each. By taking a share in adjacent markets, the largest of these firms might strike an output of from 2,000 to 5,000 units per year, in contrast with the present Bay area maximum of 1,200.

Turning to product improvement as the next net result of evolutionary forces at work, it may be expected that the house of tomorrow will rise above today's standards in design, quality, and spaciousness. With their increased emphasis on management and performance, the larger firms will pay more attention to building livability into their homes.

They will have to do this, for the protection of their reputations, if they are to remain large over a long period of time. It is only possible to milk the market in the short run, such as the recent period of excessive demand. For long-run success, large firms will have to introduce innovations and improve their merchandise. Builders' mistakes are impressed durably on the landscape. Although such mistakes did not deter the eager postwar homeseekers from buying, the return of more normal market conditions will compel builders to offer a satisfactory product if they are to attract new purchasers or to resell to previous customers.

Product improvement will require research and market analysis, activities on which housebuilding has spent only minor sums compared with other industries. Housebuilders have conducted virtually no research into materials, methods of production, or the market. The only study in these fields has been carried out by materials producers and by the government. As a result of heightened public interest in housing, Congress has appropriated funds for housing research, and helpful results have already been obtained.

Better industry organization and coöperation among firms can be expected to bring about important advances on these lines. Although research seems hardly worth undertaking to the individual builder because of its high cost compared with the returns to himself, research takes on greatly enhanced values when conducted collectively for builders as a group. Builders have already banded together for advertising and promotional purposes in Pacific coast areas, and progress in market analysis is a logical next step. Most builders are more interested now than formerly in market conditions and consumer needs.

When the industry as a whole is prepared to take a more active part in studying its methods and its market, both under its own power and in coöperation with others, better materials and means of production will develop at a faster rate. Present technological lags will be shortened. Even in the local market, builders acting coöperatively through joint organizations will be able to make long strides in market analysis. When they find out exactly what buyers want, and offer it, there will be a real improvement in housing. This improvement will benefit the builder as well as the buyer. There will be an increase in the amount of money spent for housing, because more buyers will enter the market and invest larger sums when they can obtain the values they really desire; and there will be a decrease in the cost of producing housing, because builders will avoid losses of energy and wastes of materials due to poor guessing.

The market forces of the future will probably bring profits, as well as the product, more into line with the consumer's standards. In the seller's market, builders have obtained large profits without having been pressed to increase efficiency, improve quality, or substantially lower prices. In a buyer's market, not only will efficiency have to be increased and quality improved, but firms may well have to shave their prices and profits in order to insure a stable sales volume.

Although builders' profits on sales were not unduly high in the postwar period, home buyers were paying more in profits during these years than they had paid in the past and more, in all probability, than they will in the future. Builders were both surprised and pleased by their profit rates after the war, and they did not expect them to last. They recognized that they were in an extremely fortunate position because of high demand, and that it was a make-hay-while-the-sun-shines situation. To risk a forecast—past experience suggests that a drop from a median of 8.5 per cent on sales to 3 or 4 per cent might be expected and that a spread around this level would be narrow. Such a fall in profits would be dangerous only if it retarded additional investment in the industry, or drove out of the industry the progressive entrepreneurs and innovators who were attracted to it by the chance for high profits on low investments—and who have done the most to increase housebuilding's efficiency.

Turning, finally, to the effect of the evolutionary forces on the production process, increased size of firms and improved management

may be expected to bring about better standardization, controls, and job organization; new materials, tools, and techniques; advances in design, and greater ease of building.

At the present level of management skill, many executives are so ignorant of their own production process that they cannot improve it. They are not able to calculate the best mixture of inputs or the best technology to adopt. They cannot decide whether or not it is advantageous to substitute certain amounts and types of labor and materials for others. With more management knowledge and skill, developed through experience, research, and increasing initiative, firms will be able to determine both the best design and the most efficient approach to their organization for production.

Simplification of the production process is an important possibility for progress. Although building trends have moved in the direction of simplification, there continues to be a tremendous amount of departmentalization, a large use of skilled labor, and a heavy movement of men to and from the site. This is a complexity reflecting the continuation of the small craft tradition amidst the general transition to larger and more effective operations. Departmentalization costs too much. In an economy which pays higher and higher prices for skilled labor, those products with the highest skilled labor content are the most costly. To make houses cost less, ways must be found to use less skilled labor and fewer men per job.

Decreasing departmentalization can be accomplished by a consolidation of many of the production steps which now exist. Introduction of new tools, techniques, and materials, better coördination of trade contractors, use of fewer trade contractors, and movement of more production off the site will make this simplification possible.

The rate of introduction of these means for lowering production costs appears to be increasing. New tools include power saws, power planers, power routers, and other equipment which speeds up performance of the traditional jobs of the housebuilding process. More important than these, which merely enable existing processes to be done faster, is introduction of new materials which can eliminate some of the crafts and skills now employed. New inexpensive plastic materials which can be handled by carpenters replace tiles in many low-cost houses, thus doing away with the labor and materials cost of the tile-setter. Similarly, plasterers and masons no longer appear in many

houses. When walls are ultimately simplified and made of a single material, two men of a single craft will erect a wall at one time, in place of the ten or more men of four crafts who now make eight to ten visits to a house to perform the several applications of different layers and final expensive finishing. It awaits only further research, knowledge, and skill to achieve this and other economies with materials in the house of tomorrow.

Economies similar to consolidation of production steps occur when more of the production process is moved off the site. Work done in factories can be performed under more efficient conditions, with more mechanization, more specialization, and less skilled labor. In the case of prefabricated cabinet work, which arrives at the house ready for installation, unskilled machine operators in the factories replace several crafts of skilled workmen on the site.

Off-site production of plumbing units appears to be another cost-saving procedure which is developing. With prefabrication, pipe and fittings can be cast in such a way that the number of necessary joints can be reduced; the amount of machine work can be increased; the skill needed to put together the parts can be decreased; the general level of workmanship in the finished product can be improved. Several of the largest builders have already designed complete plumbing units and have made attempts to manufacture them. They have met difficulties with unions, materials suppliers, codes, and financial institutions.[2] If they prove as efficient as seems probable, it is only a matter of time until the restrictions will be removed. In certain instances of off-site fabrication of plumbing installations in the San Francisco Bay area, restrictions have already been dropped.

The main obstacle to further progress in moving more fabrication off the site is transportation costs. As the size of prefabricated and pre-assembled units increases, the cost of hauling them rises rapidly. This is the chief reason that so many assemblies are still site-assembled.

There is a possible collision of interests in the future development of the prefabricator and the large-scale builder. Already the type of work done at the site and the type done at the factory have occasionally overlapped. This is because prefabricators seek to move as much of the production process as possible back into the factory, including the assembling of major components such as the whole wall. Meanwhile, conventional builders have continued to do the major part of their

[2] Kelly, *The Prefabrication of Houses,* pp. 153, 262–264.

assembly work at the site, although they have wanted increased off-site fabrication and have hoped that more of their subassemblies could come to them in a finished condition.

The issue of site versus factory poses important questions as to the relationship of the one to the other and to the market in general. Would it be more economical to have a greater concentration and specialization of firms fabricating subassemblies? For example, would the country benefit by having firms specialized in plumbing assemblies, chimney assemblies, electrical installations, and the like, selling their finished products to operative builders for incorporation in their houses? Or would the country gain more advantage from having building firms specialized in the entire factory fabrication of a house, including the major subassemblies?

The answers to these questions will be determined by conditions existing in local marketing, transportation, and overhead. In these fields, the conventional builders' advantages over complete prefabricators have been great. If builders maintain their marketing advantages and their low overhead, the answer will be that movement of work off the site should continue primarily in the form of subassemblies rather than complete units.

The increasing fabrication of subassemblies off the site will, of course, reduce the number of trade contractors working in the house, by reducing the number of skilled crafts required. Thus the purpose of simplification of the production process will be served.

Even if the number of skilled trades is not reduced greatly, better planning of the work of the trade contractors offers an important opportunity for lowering production costs. Only in the most skillfully managed firms is much emphasis given to the proper production integration of the trades. With management's increased competence, reëxamination of the trade contractors' work methods and their relationship to the whole problem of building a house will bring about closer coördination, better techniques, and more mechanization, thereby contributing to the streamlining of the production process and heightening the over-all efficiency of housebuilding.

Conclusions

The critics of housebuilding have been sharply divided—the prophets of gloom who have cried havoc, chaos, and confusion in terms of profi-

teering, inefficiency, and waste, and the smiling optimists who have promised palaces for all the people at half the price of huts.

Somewhere in between the forecasts of the two groups lies the truth. Relying on the data in this volume, we may visualize the essence of what lies ahead. A new estimate of the future may be formulated—still, of course, not without risk of error. Such an estimate would run somewhat as follows:

(1) Increased scale of operation and intensified competition will lead to greater efficiency. Removing the umbrella of protection will force the average efficiency level of all firms close to the level of efficient operation which is now achieved by a small minority. Future elevation of average firms to the level of the present efficient minority should improve the production process sufficiently to lower construction costs by 5 per cent.

(2) As keener competition compels the most efficient firms to give up part of their wide profit margins, and at the same time keys them as price setters for the industry, the selling price of houses should be lowered by an additional 5 per cent.

(3) Through the greater bargaining ability and buying power which will come with increased size of firm, it is probable that economies in materials purchases amounting to from 3 to 6 per cent may be realized.

(4) By reduction of external restrictions, whose maximum costs were calculated at 7 per cent, additional savings can be made.

When all these factors are added up—improved performance, lower profits, better purchasing, fewer restrictions—it appears that a concerted effort to bring peak efficiency to the housebuilding industry, with existing methods and knowledge, could lower average costs by about 20 per cent.

Beyond these identifiable economies, a gradual introduction of new methods would occur—similar to the innovations for individual parts of the house which have taken place in the past decade—and each of these changes would further increase the efficiency of the whole operation. Finally, of course, there are the possibilities of far-reaching reorganization and radical improvement which, though not visible on the horizon today, are always a possibility.

Although it is hoped that improved efficiency will result in equivalently lower prices, this would not necessarily be the case. In a dynamic

situation, the costs of the factors required to build a house may change again as they have in the past through forces outside the industry. Housebuilders cannot control the prices of their inputs, but only the efficiency with which the inputs are used. Although improved efficiency will not guarantee lower actual prices, it does mean that prices will be lower than would otherwise be the case.

The improvements in total performance which have been estimated here as probabilities for the future may come as a disappointment to those who have been captivated by the glittering hopes of the optimists. The failure of the housebuilding industry to revolutionize itself for the welfare of mankind appears, however, to be not so much an indictment of the industry's accomplishments as it is a reflection on the wisdom of the prophets.

Where the prophets have failed by promising too much progress, it is hoped that estimates based on facts will succeed. The facts show no shake-up to be likely in the housebuilding industry, no revolution in production, methods, organization, costs, or prices. Evolution is the order of the day—in housebuilding, as elsewhere. Progress in the future will depend upon improving efficiency along paths already staked out. That even more spectacular gains in efficiency cannot be predicted on the basis of analysis and evaluation of the facts is, in a sense, a tribute to the present level of development of the housebuilding industry; that a gain of at least 20 per cent in efficiency is foreseeable represents a realistic hope for better housing in America. The speed with which the housebuilding industry brings about these gains for itself and the householders of its country will depend upon the rate at which it gathers available knowledge about itself and puts that knowledge to intelligent use.

APPENDIXES

Appendix A. General Method of Procedure and Reliability of the Estimates

The main purpose of this study was to measure fictions, beliefs, and hypotheses against facts. For this purpose, it was necessary to have accurate data and to have them in a form that was useful for analysis. Although information in the housebuilding field has improved, it is still woefully short.[1] Most data are concerned with existing houses and not with the industry which produces them. Whatever estimates exist for housebuilding are usually for the entire nation. Because of the lack of uniformity in the industry, difficulty is experienced in applying them locally.

Whatever data were available have been used in this study and are presented in the following sections. Basic, of course, are general statements as to population, housing, and income made available through the decennial censuses of the United States. These sources appear in Appendixes B and F. Census data on the materials manufacturing industries are also valuable and are used in Appendix I.

Perhaps more helpful was the fact that this area was one in which the United States Bureau of Labor Statistics had gathered housing data. This meant that sample information existed on the characteristics of houses constructed and on the methods of financing the purchases of these houses. It meant also that there was an independent estimate of the number of houses constructed in the area based upon monthly reports of all building permit centers. Finally, the Bureau of Labor Statistics gathered information on the prices of building materials. (Data from this source are described in Appendixes B, C, F, and I.)

More information was available on labor than on any other phase of the study. The United States Bureau of the Census, the California State Department of Employment, and the California State Department of Industrial Relations all compile and publish labor data. It is possible to obtain labor facts in the construction industry both for the state and the area on the numbers of men employed; on wage rates, earnings, strikes, and work stoppages; and to a certain extent on agreements, turnover, and annual income (cf. Appendix J).

[1] For a complete review of available data, cf. E. E. Ashley "Recent Developments in Government Construction Statistics," address, American Statistical Association, Dec. 29, 1951, Boston, Mass., mimeographed, United States Housing and Home Finance Agency.

Financial institutions, including the Federal Housing Administration and the Veterans Administration, title companies, and credit-reporting firms gather financial data, information on the background of firms, and some operating information, particularly with respect to costs and volume. Information of this type was made available through the Bay Area Residential Real Estate Committee and directly by the agencies concerned. While this study was under way, a similar project aimed directly at the problem of financing was in process which made available additional information in that field (cf. Appendix E).

In addition, a small amount of knowledge on over-all profits and movement in and out of the industry becomes available through the publications of tax-collecting agencies. This type of data is discussed in Appendix J.

The available data, though improved, still fell far short of the amount required for an adequate industrial study. For most questions on which information was required, no secondary sources existed. The bulk of the information on housebuilding rests with the individual firms. To obtain it, one must approach the firms through a series of surveys, case studies, and interviews. That was the primary method used in this study. Necessary data were collected from individual firms by field surveys.

In the past it was impossible to make any precise statements about the structure or operations of housebuilding firms because no one knew how many there were, which were typical, or what part each played in the entire building scene. Our primary aim in this study was to avoid this difficulty by establishing a complete universe and enumeration of all builders in the area. The objective was a complete representation of all types of firms active in all sizes and sorts of localities.

The following sections report the manner in which this aim was achieved. With a complete initial listing, information was then obtained by extensive mail surveys, followed by interviews with initial nonrespondents. Information on operations, methods, structure, background, and so on, was obtained by drawing further samples and subsamples from the original universe. The size of each sample depended upon the amount of variation in replies and the cost and difficulty of obtaining the information. In each case, the method was first to obtain as much information as possible from intensive case studies of a small

group of firms. Following this, those variables that seemed significant were included on shorter questionnaires to an expanded sample of firms.

Five separate surveys were conducted during this study and they constitute the basic research underlying this report. In chronological order, they were:

1. A mail survey of housebuilders in the San Francisco metropolitan area during the years 1949 and 1950, designed to obtain information about the size, location, general method of operation, price class, and so on of firms constructing dwelling units in 1949 (Appendix C).

2. An interviewing survey during 1950 of a sample of housebuilding firms for the purpose of obtaining detailed information on the organization, method of operation, relations with suppliers and subcontractors of building firms (Appendix D).

3. An analysis of the financial and operating records for 1949 and 1950 of a sample of housebuilding firms to procure data on the ownership and financial structure, revenue, profitability, age of enterprise, characteristics of the management, and the like of building firms (Appendix E).

4. A mail survey of trade contractors in the Bay area during 1950 and 1951 for information relating to their volume of business, method of operation, and so on in 1949 (Appendix G).

5. A study of the potential cost of construction of a "composite house" for the purpose of determining the influence of a builder's size on building cost and the quantitative effect of various restrictions in the housebuilding field (Appendix H).

The subject matter of these surveys covered 15 major facets of the housebuilding operation, more than 60 different topics, and several hundred individual items. All this material is important, and most of it is necessary, in obtaining a proper perspective of the industry and its operations and functions. The following list shows the questions asked and the information obtained. The letter or letters following each item indicate which survey was used to gather the necessary data. The letter "C" after each item in the first group, for instance,

indicates that this information came from the mail survey of all housebuilders.

I. Classification

1. Name (C)
2. Number of units completed in 1949: (*a*) by price; (*b*) operative; (*c*) contract; (*d*) tract (C)
3. Total volume of building: (*a*) new houses; (*b*) multifamily; (*c*) other new buildings; (*d*) additions, remodeling, repair, and maintenance (C)
4. Total employees on October 15, 1949: (*a*) on site; (*b*) off site (C)
5. Area or areas in which building was performed (C)

II. Organization and Management

1. Type of firm: (*a*) individual proprietorship; (*b*) partnership; (*c*) corporation; (*d*) group of affiliates (D, E)
2. Functions performed: (*a*) building; (*b*) real estate; (*c*) land development; (*d*) insurance; (*e*) rental; (*f*) materials supply; (*g*) mills; (*h*) trade contracting; (*i*) other (D, E)
3. Organization chart including number of employees in each category (D)
4. Age of firm (E)
5. Management experience: (*a*) age; (*b*) education; (*c*) years as as employer; (*d*) years in industry; (*e*) experience outside industry; (*f*) interruptions in career as builder; (*g*) failure and cause; (*h*) relatives who aided (E)
6. Determinants of size: (*a*) land; (*b*) credit; (*c*) risk; (*d*) managerial span; (*e*) availability of personnel; (*f*) satisfaction; (*g*) other (D)
7. If no longer active, reasons for halting (D, E)

III. Production, Development, and Design

1. Market analysis (D)
2. Determination of design: (*a*) stock plan; (*b*) architect; (*c*) own design (D)
3. Computations with respect to new materials and methods (D)
4. Information on new developments and products (D)
5. Information on bids: (*a*) method of seeking bids; (*b*) procedure; (*c*) time and cost (D)
6. Characteristics of units: (*a*) price; (*b*) location; (*c*) basement or utility room; (*d*) number of rooms; (*e*) livable floor space; (*f*)

wall construction; (*g*) heating; (*h*) plumbing; (*i*) fireplace; (*j*) garage; (*k*) type and style of roof; (*l*) type of floor (C, F)

IV. Organization of Production
1. Integration (D, E)
2. Method of operations: (*a*) conventional; (*b*) type of precutting; (*c*) type of preassembly; (*d*) prefabrication (D)
3. Organization of crews (D)
4. Techniques: (*a*) machinery; (*b*) patterns, templates, and jigs; (*c*) special design (D)

V. Records
1. Estimating procedures (D)
2. Materials-purchase program (D)
3. Inventory controls (D)
4. Operations-planning schedules (D)
5. Performance controls (D)
6. Cost records (D)

VI. Sales
1. Method of handling: (*a*) self; (*b*) own staff; (*c*) special deal with broker; (*d*) affiliated firm; (*e*) part of land development; (*f*) normal brokerage; (*g*) other (D)

VII. Purchasing
1. Source of supply: (*a*) retail; (*b*) wholesale; (*c*) producer; (*d*) produces own; (*e*) trade contractor (D)
2. Reasons for method used: (*a*) credit; (*b*) convenience; (*c*) risk; (*d*) comparative cost; (*e*) restricted channels (D)
3. Costs for each material through each possible channel (H)
4. Land: (*a*) developed; (*b*) undeveloped; (*i*) amount; (*ii*) method of development; (*c*) effect of land on operations (D)

VIII. Subcontracts
1. Items integrated and those subcontracted (D)
2. Reasons for subcontracting: (*a*) restricted entry; (*i*) unions (*ii*) supplies; (*b*) credit; (*c*) supervision; (*d*) comparative costs (D)
3. Relations to subcontractors: (*a*) frequency of change; (*b*) method of price negotiations; (*c*) direct relationships; (*d*) costs; (*e*) supervision (D, G)

IX. Trade Contractors' Operations
1. Classification: (*a*) volume; (*b*) distribution of volume (*i*) new

houses (*ii*) other new buildings (*iii*) additions, remodeling, repair, maintenance; (*c*) number of employees (*i*) on-site (*ii*) off-site; (*d*) location of work (G)

2. Operations: (*a*) crews; (*b*) equipment; (*c*) plans (G, H)
3. Cost and effect of scale of job: (*a*) labor costs, reasons for cost variations; (*b*) material; (*c*) overhead and profit (G, H)
4. Materials purchases (G, H)
5. Labor relations (G)
6. Relations with builders: (*a*) method of obtaining jobs; (*b*) estimating (D, G)

X. Labor Relations

1. Kind and quantity of labor hired directly (C, D)
2. Method of hiring (D, H)
3. Turnover of crews (D)
4. Efficiency of men (D)
5. Relationship with union, main problems (D)
6. Effect of working rules and jurisdictions (D)
7. Figures on productivity and costs (D)
8. Union regulations: (*a*) employer working; (*b*) working permits; (*c*) overtime pay; (*d*) foreman; (*e*) entry; (*f*) restrictions on tools and methods; (*g*) hiring hall; (*h*) travel time; (*i*) regulations on output; (*j*) apprenticeship program (D, H)

XI. Building Codes

1. Problem of obtaining permits and inspections (D)
2. Problems in content of codes (D, H)
3. Problems in administration (D)
4. Restrictions imposed by codes (D)

XII. Financing

1. Method of obtaining construction credit: (*a*) cash; (*b*) suppliers; (*c*) FHA firm commitments; (*d*) conventional mortgage; (*e*) loan on general assets; (*f*) other (D, E)
2. Source: (*a*) bank; (*b*) savings and loan; (*c*) insurance company; (*d*) other (D, E)
3. Cost (D)
4. Consumer financing: (*a*) FHA; (*b*) VA; (*c*) conventional; (*d*) source (D, F)
5. Any problems with FHA or VA or bank (D)

XIII. Firm's Financial Structure

1. Balance sheet: (*a*) total assets; (*b*) current assets; (*c*) tools and equipment; (*d*) real estate and buildings; (*e*) net worth (E)

XIV. General

1. Chief problems (D)
2. Ideas on industry (D)
3. History of firm (D, E)

For each survey, group of case studies, or interview, common statistical techniques were followed under careful controls, so that final results could be given in absolute terms, and statements could be made as to the confidence which is attached to each figure. Both the descriptive material in the body of this book and the tables are based on these studies.

The following appendixes give information as to the specific methods used in obtaining universes and drawing samples. In each case, however, the same fourteen basic steps were followed, namely: (1) listing the population of sampling units (frame), usually business units; (2) deciding what kinds of information were to be secured, that is, the potential variables for analysis; (3) developing the method of data collection, such as mail survey questionnaire, interview blank, record analysis form, and the like; (4) pretesting, where possible, the method of data collection by a small-sample pilot survey; (5) dividing the population into strata or categories (subframes), selecting sampling ratios for the strata and drawing, by a random process, the required number of sampling units; (6) collecting the complete data from responding sampling units where the survey process was used or recording data from primary and secondary records; (7) calling back on nonresponding sampling units for further data; (8) preliminary analyzing of the information and extending the sampling, if necessary; (9) transcribing the data to I.B.M. punch cards or to analysis sheets, directly or after coding; (10) setting up cross-classifications for the variables and carrying out machine or manual sorting and tabulation processes; (11) inflating the sample results to secure full population distributions; (12) calculating estimates of population parameters such as the arithmetic mean, median, etc.; (13) computing confidence limits for population parameters; (14) preparing tables in final form for inclusion in this book.

Although the preponderance of the quantitative (and much of the

qualitative) information contained in this report was obtained under strict statistical controls, a few figures are presented which were based on small, nonrandom samplings, and their reliability cannot be accurately assessed by standard statistical methods. These cases, mostly occurring in the estimation of the cost of the composite house, are explicitly noted in the text and require no comment here beyond the observation that inferior accuracy is not necessarily implied.

Even where complete population listing, stratification, random drawing of sample units, and comparison with independent estimates can be rigorously enforced, results are still subject to sampling variability, and only ranges within which "true" values lie can be given with assurance. Where it is necessary to base statements on more limited observations, the judgment of the observer as to their consistency and representativeness replaces the objective reliability measures derivable from the variability of random sample values. An observer familiar with the field and armed with supplementary information may draw inferences from sparse data which prove as valid as those based on more extensive surveys, particularly if nonnormal distributions prevail.

Two of the surveys listed above—the mail surveys of housebuilders and trade contractors—may be regarded as "complete" surveys in terms of the effort spent in establishing the extent of populations to be surveyed. Although data were then gathered by contacting of randomly selected sampling units, the fraction of universe members reached was generally high. Additional authority was lent to the data by stratifying of builders according to size and increasing the sampling fraction in the strata of large builders with greatest influence in the industry totals, whereas in the trade-contracting survey, the more important categories were covered intensively in preference to the covering of all categories thinly. In both surveys the possibility of bias from nonresponse was reduced by the following up with personal calls on a substantial percentage of nonrespondents, both to secure answers to the questionnaires and to ascertain the causes for failure to answer.

The interviewing survey of builders and the analysis of financial and operating records might be called "small sample surveys," since industry members were selected for these further studies by subsampling of the housebuilder population. Aproximately one-tenth of the active builders in the area were reached in the former; one-sixth in the latter. Here again, however, coverage of the more important strata

was emphasized, and the samples were statistically adequate, being "small" only in relation to those used in the preceding surveys.

The last of the projects mentioned can be classed as a "very small sample" survey. The "composite house" study was essentially a cost-index problem, and the measure evolved has the deficiencies common to all such indexes, including, perhaps, undersampling. As stated above, no reliabilities have been calculated for this particular study. Enough price and cost data of sufficient homogeneity were collected on each of the house components to assure that ruling prices and cost levels were reasonably well approximated, and it was not considered worth while to make further expenditures of time and effort for an almost certainly small return in increased accuracy.

Since all the estimates in this book are based on samples, they are subject to sampling variability. In addition, of course, any survey or census is subject to normal biases in response which would appear even if the population were completely enumerated. Every effort was made to keep these normal biases as small as possible, including re-checks where independent data indicated that some errors might have occurred. As a result of this care, the amount of response bias is believed to be minimal. This belief is reinforced by the fact that all data have been checked against other sources and rechecked with the men in the industry wherever possible, and, to date, no important biases have been discovered.

The amount of sampling variability depends on the size of the sample and the method by which it is drawn. When samples are drawn on a probability basis as they were in these surveys, it is possible to make statements concerning the degree of uncertainty associated with the estimates.

Table 1 shows the confidence intervals for the estimates of the number of builders and trade contractors, as well as certain other parameters. It will be observed that most of the major estimates fall within a range of plus or minus 5 to 10 per cent at the 95 per cent probability level. This means that 19 of 20 samples drawn from the same universe would be expected to fall within the given confidence intervals.[2]

In addition, it is possible to state the confidence intervals which apply to the sampling of attributes of the builders and trade contrac-

[2] The estimates in tables 1 and 2 were derived by use of the formulae for estimating sampling errors as described in F. Yates, *Sampling Methods for Census and Surveys* (London: Charles Griffen and Co., 1949), sections 7.5 and 7.7.

tors. Much of the description in this book was based on tabulations showing the percentage distribution of various attributes found among builders of a given size. The more important of these data are presented in the tables which follow.

Since these distributions are based on samples, they, too, may vary from the true values existing in the universe. The reliability of an estimated percentage depends both upon the size of the percentage and the number of replies upon which the distribution is based. Since the number of replies in the surveys conducted for this study varied both with respect to the particular characteristic being examined and the size classification of the builder, there is a difference between the reliability of separate tables as well as of the columns in a given table. The classification in table 2 enables the interested reader to determine exactly the reliability of any percentage based upon the surveys conducted at the University of California. Reliability of data taken from other sources may be found in the cited references.

Table 2 contains a list of the tables based upon original data which follow in the statistical appendix. The stub is divided into sections based upon the size classifications used for builders with an additional section for trade contractors. In each section, there is a listing of all tables in which the specific size classification is used. The columns are divided to list possible percentages which appear in the following tables.

To find the confidence interval for any estimate for which this book is the original source, find the proper row in table 2 based upon the appendix table in which the estimate appears, as well as the size of builder classification to which it applies. Then if the figure shown under the proper column is added and subtracted from the estimated percentage in question, it will give the range within which the percentage would have fallen in 19 out of 20 samples drawn similarly from the same population.

Appendix B. Housebuilding Production

The term "house," as used in this study, means a one- or two-family dwelling unit, as opposed to a multifamily unit or apartment. Apartment houses differ in form, in type of materials, in methods of construction, and in costs from houses. They are as remote from the house to construct as, for instance, a store building would be, and are, there-

fore, considered in the category of "other building" in the cases of housebuilders who did both. Previous studies in the field, particularly the *Census of Business: 1939, Construction* (see also *American Housing*, p. 379), also define housebuilders as builders of one- and two-family structures. Although the production of two-family units in the area was low, several firms concentrated work in this field, and neglecting their production of two-family houses would have given an incorrect picture of their operations.

Most existing statistical data are not concerned with houses as such. They are concerned with shelter and, therefore, deal with dwelling units, the basic unit of shelter. Dwelling units can be rooms, caves, houses, or the like. The number of dwelling units in a given house can, and does, change frequently. Table 3 shows the changes in the population and in the number of dwelling units from 1930 to 1950, both for the United States and for the San Francisco–Oakland metropolitan area. These data are taken from the decennial censuses, the primary source of such information.

The monthly and annual production of new nonfarm dwelling units are estimated currently by the U. S. Bureau of Labor Statistics with national estimates available back as far as 1900 (cf. *American Housing*, table 10). Data for the nation, metropolitan areas, and selected standard metropolitan areas are reported periodically in *Construction*. Table 4 shows this information for recent years. It includes data both for all dwelling units and for houses.

Because no regular information is collected about housebuilders, far less information is available on the size group that builds these units. Existing data depend upon special compilations made nationally by the Bureau of Labor Statistics for 1938 and 1949 and by the Bureau of the Census for 1939, and made as part of this study for the San Francisco standard metropolitan area in 1949.

Estimates of housebuilders for 1938 are based on a survey of building permits issued for one-family houses in 72 cities (cf. "Builders of 1-Family Houses in 72 Cities," *Monthly Labor Review*, September, 1940 [R. 1151] and "Operations of Urban Home Builders," *Monthly Labor Review*, May, 1941 [R. 1313]). The total number of builders in the medium and large classifications has been estimated (cf. table 5) by dividing all urban areas of the country into population size groups and considering the reports obtained from the enumerated areas as a

subsample for their own particular size groups. The estimate for the number of builders in each classification was obtained by multiplying the number of builders reported in the subsample by a blowup ratio obtained by dividing the number of completed houses in the whole population size group by the completed houses in the subsample.

This estimate is thought to have a downward bias because: (1) The use of permits in the original survey may underestimate actual sizes because some firms may have used different names and built in other areas. (2) Houses built in rural nonfarm areas are not included. (3) The enumerated subsamples may underrepresent urban suburbs of large cities. On the other hand, all cities of more than 500,000, the only ones where large firms were reported, are completely enumerated. (For a discussion of this entire problem, as well as an independent survey confirming the approximate level of these estimates, cf. *American Housing,* Appendix C.5.)

The data for 1939 are estimated from the *Census of Business: 1939; Vol. IV. Construction.* The Census enumerated all operative builders. Although the coverage of the census is thought to be somewhat incomplete in the lower brackets, there is no indication of any unusual bias for the medium- and large-sized firms discussed in this section. The Census reports by size-groups the number of operative builders in the United States, as well as the total value of work each group performed on one- and two-family houses.

In order that the data might be used, it was necessary to convert the value of work figures into house units. This was done by assuming that a house was completed for every $2,000 of work performed (including materials and values added) by an operative builder. The average construction cost of houses in 1939 was $4,000 (cf. *Housing Statistics*). The average builder performed half the work on houses he built and subcontracted half (*Census of Business: 1939; Vol. IV,* table 9A).

Based on this estimate, medium-sized builders were those whose volume of work exceeded $50,000 in 1939, and large-sized ones were those with a volume of work of more than $200,000. The estimates for table 5 were derived from table 5A of the 1939 Census. This estimate is for operative builders only, and, therefore, again is biased downward. For purposes of comparison, it may be observed that when builders were completely surveyed in 1949, 83 per cent of the large

firms and 65 per cent of the medium firms reported that they did only operative building. This means that some nonoperative builders should be added to the estimate if the complete number of housebuilding firms is to be arrived at. If the same ratio held in 1939 as in 1949, the estimate for all large housebuilding firms would be 111 in 1939, and for all types of medium-sized housebuilding firms would be 600. The additional firms would have been included under the heading "General contractor" rather than "Builder" in the census, and thus would not be included in table 5.

The figures for 1949 are based on a special compilation for this study from the results of the 1951 Builders' Panel Survey of the Bureau of Labor Statistics. This special compilation was necessary to meet the definition of a house as a one- or two-family structure.

Appendix C. Size and Type of Housebuilding Firms

In the past, the size, structure, and attributes of housebuilding firms were unknown. In order that this gap in knowledge might be filled, it was necessary to survey the actual firms in the industry. This was done for this study by a mail and interviewing survey of all housebuilders (C) in the Bay area.

A complete listing of all housebuilders was obtained by the copying of names, addresses, and other pertinent data from all housebuilding permits issued in any or all of the 52 permit centers of the San Francisco standard metropolitan area during the period October 1, 1948 to September 30, 1949. All permits issued to a builder in any center were combined. When all permit recipients had been listed and all obvious duplication or errors eliminated, the resulting initial population was divided into eight strata; nonprofessionals (i.e., unlicensed individuals) and seven size classes of firms—those taking out 1, 2–4, 5–9, 10–24, 25–49, 50–99, and 100 and more permits.

The original population contained 4,430 permit recipients. A questionnaire was mailed to all firms which had received 5 or more permits and to a 50 per cent random sample of those that had received less than 5. A total of 2,791 questionnaires were mailed. Of the total who received questionnaires, 643 replied by mail. A random sample was then drawn of the nonrespondents in each stratum and these sampling units were checked in person. The efficiency of this sample was increased by having the number drawn from each stratum depend upon its impor-

tance and variability. A total of 319 replies to the questionnaire was obtained through personal calls. The total number of replies received ranged from 20 per cent among the smallest builders to 90 per cent among the largest.

The replies were then edited and processed through machine tabulations. In each case, sample results were blown up by factors which weighted responses in each stratum according to whether they came from original mailed replies or call-backs. The estimates of confidence limits were also derived from data by individual stratum.

Data on builders' operations for the entire United States and for all metropolitan areas are based upon the 1951 BLS Builders' Panel Survey which followed a basically similar method. The main difference in method was the fact that the Bureau of Labor Statistics combined both area and size stratification in its sampling. Their initial estimates were obtained for a group of selected areas which were then blown up to a national total. In addition, the Bureau of Labor Statistics counted the number of houses started during 1949 and classified builders on this basis, whereas our study counted and classified by units completed.

Table 6 compares the number of units built by nonprofessionals in the United States, in metropolitan areas, and in the San Francisco area. The continued importance of nonprofessionals in housebuilding is clear. However, the BLS estimate that more than 60 per cent of the houses built outside of metropolitan areas were built by nonprofessionals appears unusually high.

Table 7 shows the number of firms distributed into size classifications. The BLS distribution is based on all housebuilding firms classified according to the number of dwelling units started in 1949. The San Francisco distribution includes all housebuilding firms classified according to the number of houses completed in 1949. Per cents here, as elsewhere in the tables, may not add to 100 because of rounding.

Tables 8 and 9 show the number of houses erected by the builders within each size group, as well as the number built operatively within each size group. The Bay area survey defines as operatively built all units constructed for the firm's own account and not on an individual contract. The Bureau of Labor Statistics considers a house as built on contract if the land was owned by others. This excludes from the operative class those units built by a large-scale builder where the land was owned by a development firm. The differences in definition are not

important either in practice or in the estimate. All data clearly show the importance of medium- and large-sized operative builders in the present market.

The reason for the variations in the number of houses shown in tables 6, 8, and 9 results from the fact that different groups are under consideration in each table. Table 6 includes all houses built within the area, whether built by nonprofessionals or by housebuilding firms. Table 8 includes only units built by the firms based in the particular area. Table 9 includes only those units built operatively by these firms. The footnote for table 10 shows the relationship among these totals for the Bay area.

Table 10 presents the same information for the Bay area in more detail and, in addition, shows the number of units built in tracts and outside the area by size groups. This table demonstrates the more complete distribution which was used for most of the analysis. The tables printed in this book are all contractions of the original distributions.

Tables 11 and 12 show Bay area firms cross-classified by separate measures of size and, therefore, also show the firms distributed by their dollar volume and their number of employees. The correlation between the measures of size is high, but not perfect. The variations are primarily accounted for by the fact that firms did other types of building in addition to houses, or that firms were not equally active during the whole year. Firms which were small when classified by houses built, but were large in volume and employees, were primarily general contractors for whom housebuilding was only a minor function. These firms are atypical, and the statements made concerning the operations of the average small firms do not apply to them. Their presence was one reason for using the median instead of the arithmetic mean in analysis, since they wield an undue influence on all means.

The small number of employees compared with completions for some firms is accounted for by the fact that firms were asked to report only employees on their October 15, 1949, payroll. For firms in business only part of the year or with an uneven seasonal distribution, a sizable difference would exist between this figure and their average number of employees with the latter more nearly correlated to completions.

Tables 13, 14, 15, and 16 furnish additional information on the

type of building performed by housebuilding firms. Tables 13 and 14 show the increased concentration on operative building and tract building which takes place as the size of firms increases. Only the smallest firms are primarily contract builders, whereas among the largest, many do no contract work whatsoever.

Table 15 shows the amount of work on other types of building (non-housebuilding work) done by housebuilding firms. It is clear that most of these firms concentrate primarily on housebuilding, though some are general contractors who build houses while doing all other types of building jobs. Table 16 shows that frequently this other building consists of apartment houses. The total number of dwelling units constructed by housebuilding firms was about 10 per cent higher than the number of houses they built.

The final group of tables discussed here, 17, 18, and 19, detail other facts about the makeup of housebuilding firms. Table 17 shows the distribution of firms by the number of permit centers in which they operated. Although most firms operate in only one location, a few built houses in more than five different cities or towns. Table 10 showed that nearly 10 per cent of the houses built by these firms were actually outside the metropolitan area. Most of these houses out of the area were in locations in adjacent counties.

Table 18 classifies firms by the number of months they were active, as well as by their size. The data in this table primarily reflect the rapid turnover in housebuilding firms. Some of the firms not active for the entire year, however, may simply have been dormant while in the process of reorganization or finding new projects. Some turnover exists at all levels. Less than full-time production is common among small firms, where owners work as mechanics for others between their own projects.

Table 19 shows the average price of houses built by each firm classified by size. Although exceptions exist, the most obvious relationship is the concentration of the small firms in the high price market. This fact is made clear also by table 39, which shows the actual distribution by price and firm size of each house completed.

Appendix D. Housebuilders' Operations

Although the mail survey of housebuilders was broad in terms of its coverage, reaching a significant proportion of all active housebuilders,

the range of information sought had to be fairly narrow, since response to mail questionnaires is determined partly by the length and apparent degree of complexity of the questionnaire form. Therefore, in order to gather additional data on the details of housebuilders' operations, the mail survey was followed up with a series of interviews conducted in a sample of housebuilding firms.

The interviewing survey was begun with a preliminary interviewing program in which periods of time ranging from an hour to several days were spent with members of building firms. It was felt that subsequent, shorter interviews could be carried on more efficiently if the principal variables to be examined could be discovered in these beginning interviews, and possible deviations from common practice focused upon in a standardized interview form. The preliminary interviews were more or less free in form and indefinite in length, nondirective, and aimed at obtaining as much information as possible; the shorter, more directive interviews were intended to secure a definite set of facts and figures and, only secondarily, where the interviewees were willing, to obtain broader statements of opinion, illustrative anecdotes, and the like.

The first step in the survey after preliminary interviewing was to draw a subsample sufficient to obtain replies from 150 builders by random selection from the population established in the mail survey. The original population, rather than the population of initial mail respondents, was used so as to avoid the possibility of bias arising from probable differences between the operations of those who answer readily and those who do not. In accordance with the scheme of stratification earlier applied, the sampling fraction was increased in the strata of larger builders. Taking for denominators the numbers of builders in the respective strata as determined in the mail survey, the sampling ratios in the 1–9, 10–24, 25–99, and 100-and-over size class strata were $^{78}/_{362}$, $^{30}/_{189}$, $^{24}/_{77}$, and $^{18}/_{30}$.

Step two consisted of sorting the sampling units by location, laying out routes for calls, and arranging appointments with firms. The third step was the interviewing process in which the field man, guided by the interview form, asked questions of the building firm member, listened, observed, and recorded data. Since the majority of the interviews occurred at building sites, the interviewers had opportunities to watch work in progress, note the methods used, and ask supplemental

questions about operations. In many cases, the interviewer was "passed around" among members of management to obtain information about particular functions from the men responsible for them. Each interview was summarized upon the field man's return to the office so that the information could be evaluated and useful leads noted.

These surveys resulted in a large number of case studies as well as specific statistical information. The statistical data were tabulated covering 30 points of the firms' operations. From the case studies and the tabulations, descriptions of typical operations and of major variations in them were written for each size of firm. These descriptions were then submitted to a group of selected builders of each size for comment. Such checking was employed to insure against important errors in interpretation or emphasis in the transfer of the data from the surveys to final form.

Sections 4–8 of chapters 3, 4, and 5, which are descriptions of the operations of the firms, and certain sections of chapters 8 and 9 are based on these surveys. Tables 20–23 are examples of some of the more important statistical tabulations derived from these data. Because much of the other data showed only a small amount of variation within classes, the results have been incorporated directly in the descriptive chapters and no separate tabulations are printed.

Table 20 lists the variations in overhead personnel which occur with size. The table contains data only for those firms which did 90 per cent or more of their volume in housebuilding. If the firms that did large volumes of other types of building were not considered separately, their overhead staff primarily engaged in other functions would have been reflected in this table, and the true relationship between size and overhead for housebuilding would not have been clear. The supreme importance of owners working as foremen and handling executive functions in their spare time, as well as the growth of overhead with size, are both clear. Figure 6 in chapter 5 shows the division of this personnel in typical large firms.

Table 21 shows the replies of housebuilders to a question aimed at discovering the main factors that led firms to maintain their present size instead of expanding. The figures in each column add to more than 100 per cent, since each firm could list several reasons for not expanding.

Tables 22 and 23 are based on some of the information gathered

on the relationship between housebuilders and their subcontractors and materials suppliers. Table 22 shows the number of housebuilders who integrated certain trade contracting functions by directly hiring their own labor to perform any of the functions usually performed by trade contractors (figure 3 shows a list of these trade contractor functions). Concrete work and hanging of dry walls have been excluded from this compilation because these two items vary so much from firm to firm and also within a firm from house to house, depending on scheduling problems, that no generalization as to the most common channel for these functions can be made. It is clear that some integration of functions occurs with size, but the amount remains slight. As noted in the text, there is an offsetting trend, with large firms subcontracting some additional items which small firms perform with their own crews. Table 23 shows the number of firms using traditional channels of materials distribution. As is clear from the text discussion, when firms buy some products at wholesale, there can still be some variation in the number and type of products purchased at this level. In addition, cost differences can occur within a given channel depending on bargaining and the particular outlet employed. Thus the fact that firms buy only at retail may not necessarily mean that they get no quantity reductions.

Appendix E. Information on Firms' Age, Characteristics, Ownership, and Financial Operations

For the analysis of housebuilders' characteristics and financial and operating figures, a special survey was required. This survey was based on financial reports filed with financial institutions. The sample taken was not completely random because only sampling units were selected for which a mail survey return (initial mail response or call-back) or completed interview form was available. A search through all the available financial records was made to determine for which of the firms represented by earlier returns further data were available, and 266 eligible cases were found. The distribution of firms was practically identical with that of the original universe, with an exception of a slight underrepresentation in the smallest-size category. That the smallest-size stratum was not fully represented can be explained by the lesser probability of established small firms rendering full financial reports or of newly formed small firms yet having had a chance to

appear. In the 1–9 size class, sampling ratios varied from $78/1362$ to $132/1362$, in the 10–24 class from $42/189$ to $60/189$, in the 25–99 class from $26/77$ to $48/77$, and in the 100-and-over class from $16/30$ to $26/30$, depending on the item of information considered.

The aim in assembling the data was to tie together the aggregates derived in the mail survey of housebuilders and the details accumulated in the interviewing program with information showing in quantitative terms the influence on financial affairs of size, method of operation, and other variables. Also, it was considered desirable to fill in the background on different sizes and types of firms in terms of length of existence and growth, source of management skills, and so on.

Information which reveals the financial structure and operating position is the data most closely guarded by housebuilding firms. They are often understandably reluctant to give complete and specific cost data[3] or indicate operating margins, and there is small likelihood of many making statements regarding profitability without strong reason. Even where firms are willing on principle to divulge such information, it may be necessary for them to go to more trouble to get it together than they think reasonable. For these reasons, and because tentative investigations confirmed the probability of restricted response, the collection of general financial data was confined to the secondary, though reliable, detailed financial information that builders filed with credit-reporting agencies, lending institutions, and government agencies. It was necessary, of course, to guarantee the anonymity of individual firms in the final presentation of data, but this was not an important impediment.

Although the number of statements (266) checked in our survey was sufficient to give a high degree of reliability in sampling variability, possible statistical pitfalls in relying on such sources of information are apparent. Certain firms may have reported incorrectly, or their data may have been incorrectly analyzed. There is no way to estimate reporting bias. A large percentage of returns is prepared by public accountants or may be true copies of the firm's income tax reports. Most firms recognize the seriousness of credit and financial reporting. Accuracy is as high as the industry's general standards of integrity.

[3] We circumvented this difficulty in the composite house and price survey, however, by asking each contact about only a few cost items and building up the total cost structure by aggregating data from firms equivalent in all important respects.

After selection of the most frequently occurring items of information in the firms' financial records, coding instructions were drawn up, and the information for each firm in the sample of 266 was analyzed and recorded on a coding sheet. The data were then punched into the I.B.M. cards for subsequent machine cross-classification for ultimate translation into population distributions.

The tabulations which follow were derived from the cross-classifications mentioned above and are distributions applicable to the population of housebuilders in the Bay area as established by the mail survey of housebuilders. This was accomplished by calculating the percentage distributions by strata of the sample data and applying the percentages to strata totals (numbers of firms) found in the mail survey.

Tables 24–27 present certain data on the age and background of housebuilders. Among the facts that stand out are the young average age of firms, the middle-age and craft background of the owners, and the concentration of ownership into proprietorships and partnerships. At the same time, important variations in all these attributes exist, related to size of firm.

Tables 28–35 all give information on the financial operations of builders. The first three tables deal with balance sheet items. They, plus similar less important tables not shown, enable one to draw up the typical balance sheet for firms of each size, as has been done in figure 2.

Tables 31 and 32 show the relationship of certain of these assets to sales volume. They thus indicate the manner in which these assets have actually been used. Finally, tables 33, 34, and 35 all present data on the profit experience of firms. These show both actual profits and their relationship to sales volume and net worth. Net profit is defined for corporations as the profit before taxes. For proprietorships and partnerships, it is the net return before taxes minus an imputed wage of \$5,000 per year for the proprietor or per partner. These returns are related to total net worth and sales volume, including that part arising or used in other building operations.

Appendix F. The Product

Information on the characteristics, prices, and final mortgage financing of houses in this study is based on data gathered by the Area Housing Program of the Bureau of Labor Statistics. Since this program was

gathering complete information on these characteristics for all one-family houses started in the San Francisco area in the last half of 1949, it was decided not to duplicate collection of similar information.

The survey of housing characteristics by the Bureau of Labor Statistics and purchasers' financing was similar to the Bureau of Business and Economic Research Survey described earlier, except that it was based on a study of individual houses drawn from a universe of all building permits instead of on a study of builders. Complete details of these surveys, as well as estimates of their reliability, can be found in *Construction,* February, 1951, pp. 6–14.

The BLS surveys did not attempt to estimate characteristics for all houses built in the United States, but only for those built in the 15 large metropolitan areas actually surveyed. Approximately one-third of all nonfarm single-family houses started in the last half of 1949 were constructed in the areas surveyed. They accounted for half of all house-building which took place in metropolitan areas. (Cf. *Housing Statistics,* January, 1951, tables 1–3, and *Construction,* August, 1951, table 6.) The San Francisco area accounted for about 6 per cent of the production in the 15 areas. Its production, therefore, was 3 per cent of all metropolitan building and 2 per cent of all nonfarm housing.

The houses built in these large metropolitan areas are not typical of the entire national production. Known differences exist with respect to both construction costs and prices. The average construction cost in the 15 areas was $8,500 in the last half of 1949, whereas it was $7,250 for all other nonfarm houses. These differences probably reflect variations in both unit costs and characteristics.

Table 36 compares some of the main characteristics of San Francisco houses with those of the other areas. It is evident that San Francisco houses rank at or near the top in space and other special items, but they are at or near the bottom in those features necessitated by rigorous weather. The Bay area has the lowest number of small houses and is second highest in both median and mean space. It is similarly high in garages, fireplaces, and community water and sewers. On the other hand, it is low in basements, extra bathrooms, and central heating.

As a result, the construction cost and price of the Bay area house are slightly above average. The exact amount is not clear from the table because only arithmetic means are available; and these, because the cost and price distributions are skewed, are not suitable for accurate

comparisons. This fact is demonstrated in table 37 which gives a frequency distribution of prices and shows the gap between the median and mean.

Additional information on the characteristics of the houses is presented in table 38 which is based on the same survey as table 36, but in this case, the replies have been classified also by size of builder. It is clear that the houses built by the smallest builders have a much higher percentage of expensive and custom features.

This same variation in cost and size is observed in table 39 which is based upon the Bureau of Business and Economic Research survey of Bay area housebuilders described in Appendix C. Another factor worth noting is the great similarity in the price distributions of tables 37 and 39. These are independent estimates of the price of houses produced in the Bay area. They are very similar in results, even though the data from the Bay Area Survey cover more houses and a longer period of time than do those of the BLS.

Table 40 contains data on selected mortgage characteristics as well as on the type of lending institutions and type of loans made for the purchases of single-family houses. Table 41 presents similar data classified by the income level of the house purchaser. It also shows the estimated income distribution in 1949 for all families based on census data. This table enables a comparison to be made between the income distribution of all families in the area and those who purchased new houses.

Appendix G. Structure of the Trade-Contracting Industries

Because general ignorance of the number, type, and operations of trade contractors was, if anything, greater than that concerning housebuilders, this study included a detailed mail and interview survey of trade contractors. The method followed was identical with that used for housebuilders. A universe was established, and questionnaires were mailed to each firm in the universe. After mail replies had been received, a sample of nonrespondents was drawn, and these firms were called on in person. The editing, tabulation, and analysis also followed similar lines.

The universe in this case was established through the fact that all trade contractors in California must secure operating licenses from the Contractor's State License Board. This Board publishes a directory

showing the names and addresses of all licensees. All firms in the categories covered who had addresses in the six Bay area counties were included in the universe, with the exception of painting for which only Alameda and Contra Costa counties were used.

Because of limitations of cost and time, the survey covered only 5 of the 17 building trades which perform trade contract work on houses. The 5 trades surveyed—painting, plumbing, flooring (wood), cement and concrete, and masonry—made up 58 per cent of the licensees in the area and accounted for about 72 per cent of the cost of subcontracts for the typical house.

Table 42 shows the number of licensees in the various trades. It also shows the number of active licensees in the trades surveyed. The trades selected require application of a fairly wide range of skills, and it is believed that their characteristics are representative of trade contracting firms in general. The average results obtained for four surveyed groups (excluding painting) have been applied to the number of licensees in the remaining trade contracting categories. This is considered as an estimate of the probable values for this "all other" category. In this manner, it is possible to obtain some idea of the total trade contracting picture. It will be inexact, however, so far as the surveyed groups do not accurately represent "all others." The 26 per cent of licensees not active include those retired, those working as mechanics for others, those temporarily out of the industry but retaining their license, and those engaged in partnerships where several individuals are licensed but operate together as a single firm.

Some estimate of the accuracy of these estimates may be obtained by comparison with the figures of the State Department of Employment in its report on the average number of trade contracting firms who had one or more employees in 1949. (Cf. *California Employment and Payrolls, 1949* [State of California, Department of Employment].) The average number of firms reporting in each quarter was 3,059. This includes special trade contractors who were not of a type to work on houses and, therefore, were excluded from our survey. This compares to an estimate of 2,779 ± 410 for housebuilding trade contractors without employees from this survey (col. 3, table 42 minus col. 2, table 44).

Tables 43, 44, and 45 show respectively the size distribution of trade contracting firms by volume of sales, by all employees, and by overhead employees. Comparison may be made between these tables and tables

11, 12, and 20 which give the same type of information for housebuilders. In making this comparison, it must be remembered that housebuilders' dollar volume is higher per employee because of their payments to the trade contractors and for land.

Tables 46 and 47 indicate the percentage of their volume performed on new houses by trade contractors. This amount varies with the trade (in some, maintenance and repair work makes up the bulk of their work) and also with the size of the firm. This latter relationship fluctuates from trade to trade, and for that reason table 47 portrays the specific cross-classification in selected trades.

The final table in this group, 48, demonstrates the greater spatial flexibility of trade contractors compared to housebuilders. Since their average job is far smaller than that of a housebuilder, they must work on many more jobs. Frequently, this requires spreading into several adjacent areas. In addition, because the trade contractor's work is similar throughout the region and because his marketing problem is simple, since he has to deal only with other builders, it is easier for the trade contractor to work over a larger area if he so desires.

Appendix H. Pricing of the Composite House

Certain chapters of the text (particularly 7 and 8) have already given a good deal of information about the method of pricing the composite house. It will be recalled that the house is essentially an index which allows weights to be assigned to prices for each separate element.

Plans for a typical 1,000 square-foot house were drawn up; a complete materials take-off was made as well as a listing of the required amounts and specifications for each subcontract. Costs were divided into five groups: direct materials purchased, subcontracts, direct labor, incidentals, and profits and overhead. Data for each group were obtained separately.

For materials, the composite house required 30 major items to be purchased by the builder. A list was made up showing the exact amount of each required. This list was then taken to ten retail lumberyards, five wholesalers, and several mills and mill representatives. In each case, the dealer was requested to report the prices of each item as well as any quantity discounts he allowed. If the dealer was a wholesaler or mill owner, information was requested as to the circumstances under which he would or would not sell to a builder.

These figures were then checked from other sources. A selected group of builders was requested to report the prices paid for materials; all builders in the subsample (Appendix D) had previously been asked the channels through which they purchased their materials. Other groups, including the Bureau of Labor Statistics, the Veterans Administration, and major banks in the area, all of whom gathered similar price data, made available their reports on typical prices.

The final estimates shown in this report were based upon the most typical prices charged in whichever channel was used by the majority of builders of a given size. As indicated previously, variations were found between dealers at each level, but these variations were not great. Also, experience in this and other fields indicates that markups in any field tend to be standardized and that those found in one group of firms are likely to be duplicated in all.

The second group of costs contained subcontract prices. The exact amounts and specifications for 15 subcontracts were listed. This list, with a copy of the house plan, was taken to between 5 and 10 trade contractors for each type of work. These contractors were selected to represent all sizes of firms active in the new housing field. Each trade contractor was asked to estimate his charges for the required item if it was installed in a single house (scattered sites), a tract of 30 houses, and a tract of 100 houses. Wherever possible, these estimates were checked against recent bids for similar work. At the same time, we discussed with him the breakdown of the estimate into labor, materials, and profit and overhead, and we asked an explanation as to why the charges varied by size.

The final estimates for each trade again came from the most typical figures. These figures were also checked with builders, with materials suppliers, and with the other agencies gathering similar information. They were also scrutinized for internal consistency.

The third set of costs—for direct labor—was harder to obtain. The difficulty of making estimates of this type, with the large opportunity for error involved, should be apparent to anyone familiar with building practice. To ascertain the differences in costs or labor inputs achieved on the average as a result of changed scale, we had to obtain recorded outputs and inputs for various-sized firms. These outputs and inputs had to be comparable to be useful. However, it is clear that comparability can differ widely for at least three basic reasons: (1) In-

puts within a given firm will vary with weather, with available labor supply, and with other factors in the labor market. (2) No two firms produce identical units. For example, there are obviously tremendous differences between the typical so-called GI house with minimum fittings and the expensive mansion filled with all types of hand-finished items. (3) Finally, not only will specific functions differ among firms, but in each, direct labor costs will depend upon which functions are handled by the concern itself and which subcontracted.

How, then, did we arrive at our estimates of labor saving? The first problem was met by use of a uniform period of one year, 1950, for all firms. In a given year, it may be assumed that all firms in the area experienced approximately the same conditions of weather and labor supply. At the same time, firms were asked to report average direct labor costs for the period. This, it was hoped, would remove the problem of fluctuations from house to house within a firm because of unusual internal conditions. Since labor costs within the same firm may fluctuate 10 per cent on either side of their average, failure to use the average can lead to decided biases.

The problem of variation in types of houses was met by limitation of the study to houses of approximately the same class, built on flat land in roughly the same areas. At the same time, we attempted to handle the problems of other variations in the houses by expressing labor inputs as a percentage of dollar and unit outputs for each particular firm. Comparison of the input-output ratio instead of direct labor costs is believed to have ironed out many of the differences arising from house to house variations.

To gain similarity, we used a fairly narrow range for selling price and gross floor area, including, in the latter, both living space and the garage. The price range of the houses selected was $8,400 to $12,800, with most houses falling between $8,900 and $10,000. Gross areas ranged from 1,000 to 1,400 square feet. The average price and area range compared favorably in each size class. Average price of the houses handled by small firms was $9,600; for the medium firms, $9,700; and for the large firms, $9,800.

It is possible, of course, that neither price nor area is a good index of comparability. Firms of a certain class could include more value in a house of a given price. However, examination of actual units produced and other data indicate that this did not occur. Whereas size and

price of house are inversely correlated to size of firm, when a selection is made of units of the same size, price, and location, characteristics, and workmanship are approximately equal. Individual differences that might exist between firms are resolved by use of the class averages.

As for the third problem, in operations performed directly, wide variations are not usual. Principal differences occur when firms do or do not perform their own concrete work, hanging of wallboard, and painting. When firms included other items under direct labor, we did not attempt to use their reports. For the typical house, it was assumed that a firm hangs its own wallboard but subcontracts concrete and painting. In this case, which held for the majority of firms, reported labor costs could be used without adjustment. When a firm reported variations from items normally handled, correction factors were used to make its report comparable to the standard. These were obtained from data showing the ratio of each of these variables to all costs for particular firms.

In practice, obtaining labor data was a fairly simple and clear-cut procedure. Personal interviews were arranged with 52 firms to obtain figures on average labor costs per house. These firms were asked to describe their most typical house built in 1950: its gross area and selling price, labor cost, operations included in labor cost, and any other pertinent information. Replies were then screened to eliminate inadequate figures, extreme deviation from the average in type or price of house, and the inclusion of unusual operations in direct labor.

As a result, only half the replies were used. They included ten large firms, six medium, and ten small. The reported figures were then adjusted by percentage correction factors to give the direct labor costs for performing identical operations. At this point, we had a labor cost based upon a like set of operations but performed in houses with different gross floor areas and a different selling price for each firm. To correct for the variations, we divided the labor cost by the gross floor area to obtain a cost per square foot for each firm. These were then arranged and averaged by class of firm. At the same time, the labor cost was expressed as a percentage of selling price for each firm, and these results were also arranged and averaged. This, then, gave us the average direct labor cost per foot or per dollar of sales value for performing identical operations. This is the figure necessary for comparing the average input in each size class for an identical unit of output.

For the small firms, the average direct labor cost per gross square foot was \$1.15 with a range between \$0.97 and \$1.39. For the medium firms, the average was \$1.01 with a range from \$0.80 to \$1.39. For the large firms, it was \$0.85 with a range from \$0.60 to \$1.04. In all cases, the mean and median were approximately the same (within 3 per cent). Of the total selling price, direct labor costs averaged 14.6 per cent in the small firms with a range from 12.4 to 17.8 per cent. It was 13.1 in the medium firms with a range from 9.2 to 17.2, and 10.9 in large firms with a range from 6.0 to 13.9 per cent. It should be noticed that the results obtained by both methods are practically identical.

As we stated initially, the specific figures obtained through these selected reports are obviously subject to error. The number of usable cases is not large. The method of insuring comparability also can give variation. On the other hand, the results confirm the observations in the case studies which are based on a much larger sample. In addition, they agree with informed opinion.

Information on incidental costs—the fourth item—was obtained directly from builders as part of the survey described in Appendix D. The final estimate for the operating margin was obtained from the survey of financial statements discussed in Appendix E. After all direct costs had been obtained for the average builder of a given size, this amount was increased by the average percentage operating margin for builders of the same size. This total was then considered as the typical cost for the particular size group.

Table 49 shows the amounts paid by the builders of different sizes for each major cost of the house, including each of the major subcontracts. These figures, it must be recalled, are averages within each group based upon the plans for the composite house just discussed.

Tables 50, 51, and 52 show these figures in greater detail. The first shows the way in which total labor costs vary with size. In this, it should be noticed that the small amount of building labor hired by many trade contractors is not separated out from the main trade employed by the particular contractor. Table 51 demonstrates the way in which each materials cost varies. Table 52 shows overhead and profits. Land, which is the final cost, was assumed constant in all cases. The reasons for all these cost variations were discussed at length in chapter 8.

Appendix I. Materials Supply

In discussing the supply factors to the housebuilding industry, a distinction must be made between exclusively housebuilding materials and materials used both in construction and other purposes, since the picture obtained of structure and price movements will differ, depending on the manner in which this division is made. This problem arises because the standard classification of industries is based primarily on characteristics and not on use. Some industries produce mainly construction materials, but in others, such as steel, the amount going to housebuilding forms only a small part of the total. If, however, steel is included in an aggregate index of construction materials in accordance with its over-all importance to the economy, it will overwhelm the movement of other materials which actually have far greater influence on housebuilding.

This point is made clear in the last two columns of table 53 which compares the percentage importance in production of different materials used in buildings with their actual importance in the typical Bay area house. The amount of difference is slightly understated in the case of value assigned for steelworks and rolling mills, where the computations are based on value added rather than on total production, as it true of all other items.

The difficulty of defining an industry creates another problem in discussions concerned with the structure of industries. Certain products which go into houses are not produced in homogeneous national markets. Some (such as bricks), because of transportation costs, are restricted to relatively local or regional sales. In other cases, for various reasons, the industrial classification is not homogeneous, but contains many different types of products. In these industries, a national concentration ratio is likely to be ambiguous, because in the case of regional products or those with mixed outputs, particular companies could control a much larger share of specific markets than would be indicated by the national data.[4]

The industries which seem to fall into these classifications are cement, lighting fixtures, bricks, sheet metal, electrical wire, water pipe, and furnace and hot-water heaters. These items are footnoted in table 53.

[4] Joe S. Bain "Relation of Profit Rate to Industry Concentration: American Manufacturing, 1936–1940," *The Quarterly Journal of Economics,* Vol. LXV, No. 3 (August, 1951), 299–304.

In general, classification rests on the distinctions made in *The Structure of the American Economy* among industries that are national or regional and "straight" or "mixed."[5] An industry was considered nonhomogeneous if it was not both national and straight. An industry considered homogeneous satisfies, in general, the requirements of a theoretical industry; that is, "a group of outputs which to all or most buyers of each are generally close substitutes for each other and distant substitutes for all other outputs."[6]

Cases were included as homogeneous where the industry was mixed, but the concentration ratio of the specific building material product under consideration had a concentration ratio approximating that of the industry.

Also, four industries—millwork, plywood, vitreous plumbing fixtures, and ceramic tile—which were classified as mixed in *The Structure of the American Economy,* have been reclassified as homogeneous for this work because their definition and coverage were changed by the time of the 1947 census.

The use of industries for concentration ratios raises other problems, but none believed important enough to invalidate the very general statements made concerning them. For example, the amount of competition in lumber is somewhat overstated because lumber is produced in different parts of the country, and certain types are not complete substitutes for others. On the whole, though, the degree of substitution possible and the very large number of firms clearly support the accuracy of the contention that there is only slight concentration of control in lumber.

The breakdown of materials in table 53 is somewhat more complete than in table 51, because hardware, plumbing, millwork, and electrical materials draw from several industrial classifications. In these cases, the totals shown in 51 have been distributed to their component industries. In addition to weights, table 53 also indicates the number of companies in each industry and the concentration of market control among the 4, 8, and 50 largest firms in each industry. The figures are based on the total share of the industry's production manufactured by these firms. One point worth noting is that when concentration is low for the first 4 or 8 firms, then even the 50 largest will usually not control a large share of the market. On the other hand, in those cases

[5] U. S. National Resources Committee, *The Structure of the American Economy* (Washington: Government Printing Office, 1939).

[6] Bain, *op. cit.,* p. 298.

where 4 or 8 firms have a medium control, then the top 50 will usually control almost all output. This is even more true, of course, when the first 4 or 8 firms start with an important share of the total market.

Tables 54 and 55 show the distribution of building materials by the percentage of production concentrated in the 8 largest firms. We have constructed the first of these tables using as weights the importance of the materials furnished by an industry for the typical Bay area house. In the second we have used as weights the industry's share of the total production of all 23 industries. The first two columns in each table are based on those materials which do not fall into the ambiguous market group, and the second two columns show the distribution of all materials, with this group included but shown separately.

Table 56 records the wholesale price movements of building materials as reported by the Bureau of Labor Statistics. These figures, of course, are subject to all of the problems normally contained in data from this source. The BLS new index was not carried back before 1947 for subclassifications. For this reason, it was necessary to construct specially the building materials index. The method used was to change the old subgroup relatives to the new base and then to multiply these relatives by the new weights. The results obtained by this procedure will differ slightly from a complete reconstruction of the index. The reason is that weights within the subgroups have also been changed. As a result, simply shifting the base year of the old relatives will not give the same results as reconstructing them. The two methods were, however, compared for three overlapping years, and differences were found to be small.

Appendix J. Data on the Labor Force, Entry, and Profits

The remaining tables contain data drawn from various secondary sources. These data suffer from the fact that they, as a rule, do not differentiate between information for housebuilders and that for other types of builders and trade contractors. Furthermore, most of the data are available only on a national basis, with not more than occasional glimpses of the actual situation in the Bay area.

The failure to differentiate between housebuilding and other building data is least important in the labor field. In the first place, most of this information does separate facts on those employed by builders and those working for trade contractors. In addition, previous information showed that trade contractors' work, and consequently their

labor, was spread among new housing, other building, and maintenance, and, therefore, no real differentiation was possible. Although employees working for housebuilders were most likely to work only on houses, their next job might be for a general contractor on other types of building. Even when there was little interchange between these groups, the existence of the other workers and the fact that union agreements normally were negotiated for and covered employees of all builders mean that, for many purposes, the figures covering both groups are satisfactory.

The failure to separate out housebuilders and the lack of even state data, let alone local, are far more serious faults with respect to entry and profit information. These figures are primarily based upon Social Security and Internal Revenue data as adjusted for the National Income Accounts. For both entry and profits, rates applying to housebuilders and general contractors are likely to be quite different. In addition, the profit data are based only on corporations, though at least half the volume in housebuilding is performed by noncorporate firms. Since there is a correlation between size, incorporation, and profits, this would be likely to bias the figures upward. If an upward bias exists, it acts primarily to add further emphasis to the analysis of chapter 10.

Table 57 shows the changes and relative changes which have taken place in the construction labor force. It is clear that construction has seen a more rapid expansion in employees than most other industries.

Table 58 reports wage data for construction employees in general as well as for California. Construction workers make a higher weekly return than do other groups, though working fewer hours. For each item, construction workers in California are better off than are those in the rest of the country.

Table 59 presents data on work stoppages in the postwar period. Such data are necessary in the determination of the relative effect of strikes in building as compared with other industries.

Tables 60 and 61 show profit rates on income and equity for construction corporations as compared with other selected groups. The data for profits on income come from the Bureau of Internal Revenue as adjusted and estimated by the Bureau of Foreign and Domestic Commerce. The data for profits on net worth are collected by the Securities Exchange and the Federal Trade Commissions.

Table 62 shows the net growth and the rate of entry and discontinuance for all contract construction firms as well as all manufacturing firms and all nonfarm firms in the United States. In addition, net growth rates are available for Bay area construction firms showing the difference between the growth of building firms and special trade contractors. Since housebuilders comprise about 80 per cent of all building firms, these data also allow a more direct estimate of the change in housebuilding firms.

TABLES

TABLE 1

CONFIDENCE INTERVALS OF ESTIMATES

(95 per cent probability)[a]

Estimate for number of	Value of estimate	Confidence interval
Small builders (1–24)	1,551	1,446–1,656
Medium builders (25–99)	77	61–93
Large builders (100 and over)	30	25–35
Cement and concrete contractors	116	105–127
Flooring contractors	123	105–141
Masonry contractors	119	108–130
Painting and decorating contractors	1,232	1,119–1,345
Plumbing contractors	423	384–462
Above five trade contractors	2,013	1,893–2,133
Houses built in Bay area in 1949	17,799	16,823–18,767
Houses built by Bay area builders and nonprofessionals in 1949	19,487	18,137–20,847

[a] Estimates from 19 out of 20 samples would be expected to fall within the confidence interval shown.

TABLE 2

FIDUCIAL LIMITS FOR PERCENTAGES ESTIMATED FROM BUREAU OF BUSINESS AND ECONOMIC RESEARCH SURVEY DATA

(95 per cent probability)

Size-class and appendix table	Estimated percentage[a]					
	5 or 95	10 or 90	20 or 80	30 or 70	40 or 60	50
1–9 Completions						
Tables 10–19	2	3	3	6	6	6
24–27, 30–31	4	5	7	8	9	9
20–23, 28–29, 32	4	6	8	9	10	10
33–35	5	7	9	10	11	11
10–24 Completions						
Tables 10–19	4	5	7	8	8	9
20–23	4	6	8	9	10	10
24–32	5	7	9	10	11	11
33–35	6	8	11	12	13	13
25–99 Completions						
Tables 10–19	4	5	6	7	7	8
24–27	4	5	7	8	9	9
30–31	4	6	8	9	10	10
28–29, 32	5	7	10	11	12	12
20–23, 33–35	7	9	13	15	15	16
100 and over						
Tables 10–19	3	4	5	5	6	6
24–27	3	4	6	7	7	7
30–31	4	6	8	9	10	10
28–29, 32	6	8	11	12	13	13
20–23	7	9	13	15	15	16
33–35	8	11	14	17	18	18
Trade contractors						
Tables 43–48						
Cement and concrete	5	7	9	10	11	11
Flooring	6	9	12	13	14	14
Masonry	5	7	9	11	11	12
Painting	4	5	7	8	9	9
Plumbing	4	5	7	8	8	8

[a] The figures in the table show the range (plus and minus) within which 19 out of 20 samples would be expected to fall.

TABLE 3

INCREASE IN POPULATION AND DWELLING UNITS 1930–1950, UNITED STATES AND SAN FRANCISCO METROPOLITAN AREA

Year	Population				Dwelling units			
	Number		Per cent increase in decade		Number		Per cent increase in decade	
	United States	San Francisco area	United States	San Francisco area	United States	San Francisco area	United States	San Francisco area
1930	122,775,046	1,323,288	....	....	32,027,894[a]	398,327[a]	....	....
1940	131,669,275	1,432,211	7.2	8.2	37,325,470	485,991	16.5	22.0
1950	150,697,000	2,240,800	14.4	56.4	45,875,000	742,800	22.9	50.0

[a] Estimated. Since data on occupied units were available only for 1930, estimate was based on assumption of same vacancy rate in 1930 as in 1940.
SOURCE: Bureau of the Census; 1950 Census; Series PC-5, No. 45; HC-7, No. 5; 1940 Census of Housing.

TABLE 4

NONFARM RESIDENTIAL CONSTRUCTION BEGUN, 1946–1951

Year	Dwelling units			Houses	
	United States	Metropolitan areas	San Francisco area	United States	San Francisco area[a]
1946	670,500	[b]	17,290	602,100	15,127
1947	849,000	[b]	19,470	757,200	16,791
1948	931,600	629,761	19,910	790,000	16,775
1949	1,025,100	718,595	20,240	805,600	15,706
1950	1,396,000	1,000,932	30,170	1,179,000	25,992
1951	1,090,000	[b]	24,000	920,000	19,000

[a] Estimated.
[b] Not available.
SOURCE: *Housing Statistics*, HHFA, December, 1951, p. 2, and *Construction Supplement*, U. S. Department of Labor, BLS May 1951, pp. 6, 7.
Construction, Annual Review, 1950. Figures for 1951 are preliminary.

TABLE 5

MEDIUM- AND LARGE-SIZED HOUSEBUILDERS IN THE UNITED STATES

Year	Number of firms by houses built		Number of houses built by size class of builder (in thousands)	
	25–99	100 and over	25–99	100 and over
1938	358	33	13.9	5.3
1939	388	92	17.8	14.7
1949	3,030	720	114.2	132.2

SOURCE: Compiled from data of the Bureau of Labor Statistics and the Bureau of the Census. For detailed explanation see Appendix B.

TABLE 6

HOUSES BUILT BY NONPROFESSIONALS IN 1949, BY AREA

Area	Total by builders and nonprofessionals	Owner-built	Per cent owner-built
United States	805,600	265,600	33
Metropolitan areas	525,000	96,000	18
San Francisco area	17,799	2,002	11

TABLE 7

Housebuilders in 1949, Classified by Size and by Area

Area	Number of firms by houses built				All firms	Per cent of firms				
	1–9	10–24	25–99	100 and over		1–9	10–24	25–99	100 and over	All firms
United States	109,170	6,680	3,030	720	119,600	91	6	3	1	100
Metropolitan areas	57,650	4,810	2,920	720	66,100	87	7	4	1	100
San Francisco area	1,362	189	77	30	1,658	82	11	5	2	100

TABLE 8

Houses Built in 1949, Classified by Size of Builder and by Area

Area	Number of houses by size class of builder (in thousands)				All houses (in thousands)	Per cent of houses				
	1–9	10–24	25–99	100 and over		1–9	10–24	25–99	100 and over	All houses
United States	216.8	76.9	114.2	132.2	540.0	40	14	21	24	100
Metropolitan areas	122.1	65.7	109.0	132.2	429.0	28	15	25	31	100
San Francisco area	4.9	2.9	3.5	6.2	17.5	28	17	20	35	100

TABLE 9

HOUSES BUILT OPERATIVELY IN 1949, CLASSIFIED BY SIZE OF BUILDER AND BY AREA

Area	Number of operatively built houses by size class of builder (in thousands)				All houses (in thousands)	Per cent of operatively built houses				Operatively built as a per cent of all houses in class				
	1–9	10–24	25–99	100+		1–9	10–24	25–99	100+	1–9	10–24	25–99	100+	All houses
United States..........	106.2	56.0	96.3	124.5	383.0	28	15	25	33	47	73	84	94	71
Metropolitan areas.....	61.9	44.6	92.1	124.5	323.0	19	14	29	39	51	68	84	94	75
San Francisco area.....	2.1	2.3	3.0	6.2	13.6	16	17	22	45	45	80	84	99	78

TABLE 10

HOUSES BUILT IN BAY AREA IN 1949, CLASSIFIED BY SIZE OF BUILDER, BY TYPE OF BUILDING, AND BY LOCATION

Size class by houses built	Number of firms in class	Number of houses built by size class of builder			
		In all areas	On contracts[a]	In tracts[a]	Outside Bay area[a]
1	270	270	143	.....	.....
2–4	694	1,985	1,139	.....	18
5–9	398	2,587	1,405	254	83
10–24	189	2,936	585	1,067	22
25–49	56	2,030	492	1,263	84
50–99	21	1,482	58	1,349	130
100 and over	30	6,195	45	5,860	1,351
Total	1,658	17,485	3,867	9,793	1,688
	Percentage distribution				
1	16	2	4	..	..
2–4	42	11	29	..	1
5–9	24	15	36	3	5
10–24	11	17	15	11	1
25–49	4	12	13	13	5
50–99	1	8	2	14	8
100 and over	2	35	1	59	80
Total	100	100	100	100	100

[a] To obtain number built by complementary method, subtract figure in this column from that shown on same line under All areas; Examples:

On contract... 3,867	In tracts... 9,793	Outside Bay area... 1,688
Operative.....13,618	Scattered... 7,692	In Bay area........15,797
17,485	17,485	17,485

To obtain total units completed in Bay area add:

In Bay area by firms.............15,797
In Bay area by individuals........ 2,002

17,799

TABLE 11

BAY AREA HOUSEBUILDERS IN 1949, CLASSIFIED BY DOLLAR VOLUME OF ALL PRODUCTION AND BY SIZE

Total volume of production (in dollars)	Number of firms by houses built				All firms	Per cent of firms in class				
	1–9	10–24	25–99	100 and over		1–9	10–24	25–99	100 and over	All firms
Less than $50,000	627	..	..	..	627	46	..	..	..	38
50,000–199,999	657	93	..	..	750	48	49	..	..	45
200,000–499,999	68	84	40	..	192	5	45	52	..	12
500,000–999,999	8	12	28	3	51	1	6	36	10	3
1,000,000 and up	2	..	9	27	38[a]	[b]	..	12	90	2
Total	1,362	189	77	30	1,658	100	100	100	100	100

[a] Of this number 4 firms produced more than $5,000,000.
[b] Less than one-half of 1 per cent.

TABLE 12

BAY AREA HOUSEBUILDERS IN 1949, CLASSIFIED BY NUMBER OF EMPLOYEES AND BY SIZE

Number of employees	Number of firms by houses built				All firms	Per cent of firms in class				
	1–9	10–24	25–99	100 and over		1–9	10–24	25–99	100 and over	All firms
0–2	648	8	2	..	658	47	4	3	..	40
3–9	553	106	11	..	670	41	56	14	..	41
10–24	87	64	38	..	189	7	34	49	..	11
25–99	70	11	26	11	118	5	6	34	37	7
100 and over	4	..	..	19	23	[a]	..	..	63	1
Total	1,362	189	77	30	1,658	100	100	100	100	100

[a] Less than one-half of 1 per cent.

TABLE 13

BAY AREA HOUSEBUILDERS IN 1949, CLASSIFIED BY PER CENT OF HOUSES EACH BUILT OPERATIVELY AND BY SIZE

Per cent of houses built operatively	Number of firms by houses built				All firms	Per cent of firms in class				
	1–9	10–24	25–99	100 and over		1–9	10–24	25–99	100 and over	All firms
0–14.9	547	16	5	..	568	40	8	6	..	34
15–54.9	308	30	8	..	346	23	16	10	..	21
55–74.9	42	5	..	..	47	3	3	..	..	3
75–94.9	82	40	19	2	143	6	21	25	7	9
95–100	383	98	45	28	554	28	52	59	93	33
Total	1,362	189	77	30	1,658	100	100	100	100	100

TABLE 14

BAY AREA HOUSEBUILDERS IN 1949, CLASSIFIED BY PER CENT OF HOUSES EACH BUILT IN TRACTS AND BY SIZE[a]

Per cent of houses built in tracts	Number of firms by houses built				All firms	Per cent of firms in class				
	1–9	10–24	25–99	100 and over		1–9	10–24	25–99	100 and over	All firms
0–14.9	1,313	102	13	..	1,428	96	54	17	..	86
15–54.9	22	20	8	1	51	2	10	10	3	3
55–74.9	3	32	9	1	45	b	17	12	3	3
75–94.9	1	8	20	3	32	b	5	26	10	2
95–100	23	27	27	25	102	2	14	35	84	6
Total	1,362	189	77	30	1,658	100	100	100	100	100

[a] A tract is defined as an area in which a single firm built 5 or more houses.
[b] Less than one-half of 1 per cent.

TABLE 15

BAY AREA HOUSEBUILDERS IN 1949, CLASSIFIED BY PER CENT THAT NEW HOUSEBUILDING FORMED OF TOTAL PRODUCTION AND BY SIZE

Housebuilding's per cent of total production	Number of firms by houses built				All firms	Per cent of firms in class				
	1–9	10–24	25–99	100 and over		1–9	10–24	25–99	100 and over	All firms
0–14.9	71	..	..	..	71	5	..	..	..	4
15–54.9	151	13	1	2	167	11	7	1	7	10
55–74.9	94	14	12	..	120	7	7	15	..	7
75–94.9	205	25	12	4	246	15	13	16	13	15
95–100	841	137	52	24	1,054	62	73	68	80	64
Total	1,362	189	77	30	1,658	100	100	100	100	100

TABLE 16

Bay Area Housebuilders in 1949 Completing Dwelling Units in Addition to Houses, by Size

Size-class	Number of firms	Units completed	Per cent	
			Firms	Units
1–9	87	1,145	66	64
10–24	22	155	17	9
25–99	17	223	13	13
100 and over	6	259	4	14
Total	132	1,782	100	100

TABLE 17

Bay Area Housebuilders in 1949, Classified by Number of Permit Centers in Which They Built and by Size

Number of permit centers	Number of firms by houses built				All firms	Per cent of firms in class				
	1–9	10–24	25–99	100 and over		1–9	10–24	25–99	100 and over	All firms
1	1,068	106	27	15	1,216	78	56	35	50	74
2	190	50	30	8	278	14	27	39	27	17
3	98	15	19	4	136	7	8	25	14	8
4	5	12	..	1	18	1	6	..	3	1
5 and over	1	6	1	2	10	[a]	3	1	6	[a]
Total	1,362	189	77	30	1,658	100	100	100	100	100

[a] Less than one-half of 1 per cent.

TABLE 18

Bay Area Housebuilders in 1949, Classified by Number of Months Active During Year and by Size

Number of months active	Number of firms by houses built				All firms	Per cent of firms in class				
	1–9	10–24	25–99	100 and over		1–9	10–24	25–99	100 and over	All firms
1–4	139	1	..	..	140	10	1	..	..	8
5–6	152	..	5	..	157	11	..	6	..	9
7–8	139	26	5	4	174	10	13	6	13	10
9–10	194	2	2	..	198	14	1	3	..	12
11–12[a]	738	160	65	26	989	55	85	85	87	61
Total	1,362	189	77	30	1,658	100	100	100	100	100

[a] No firms reported 11 months' activity.

TABLE 19

Bay Area Housebuilders in 1949, Classified by Average Price of House Built and by Size

Average house price (in dollars)	Number of firms by houses built				All firms	Per cent of firms in class				
	1–9	10–24	25–99	100 and over		1–9	10–24	25–99	100 and over	All firms
Less than $9,000	153	15	9	9	186	11	8	12	30	12
9,000–10,999	324	46	32	12	414	24	24	41	41	25
11,000–12,999	237	31	14	7	289	17	16	18	22	17
13,000–14,999	122	40	9	1	172	9	21	12	4	10
15,000 and over	526	57	13	1	597	39	31	17	3	36
Total	1,362	189	77	30	1,658	100	100	100	100	100

TABLE 20

Bay Area Housebuilders Primarily Engaged in Housebuilding (more than 90 per cent) in 1949, Classified by Off-site Personnel and by Size

Number of off-site personnel	Number of firms by houses built				All firms	Per cent of firms in class				
	1–9	10–24	25–99	100 and over		1–9	10–24	25–99	100 and over	All firms
Owner only in spare time	729	52	..	..	781	76	32	..	..	65
Owner only full time	67	61	19	..	147	7	38	33	..	12
2–4	164	42	25	2	233	17	26	43	10	20
5–9	...	6	14	5	25	..	4	24	20	2
10 and over	...	...	...	17	17	..	..	..	70	1
Total	960	161	58	24	1,203	100	100	100	100	100

TABLE 21

BAY AREA HOUSEBUILDERS IN 1949, CLASSIFIED BY MAIN DETERMINANTS OF EXISTING SIZE AND BY SIZE

Determinant of size	Number of firms by houses built[a]			Total	Per cent of firms in class			
	1–24	25–99	100 and over		1–24	25–99	100 and over	Total
Land	155	31	15	201	10	40	50	12
Risk and credit	776	62	18	856	50	80	60	52
Managerial span	714	15	4	733	46	20	13	44
Personnel	388	23	5	416	25	30	17	25
Other	418	23	9	450	27	30	30	27

[a] Columns add to more than 100 per cent because each firm could list several reasons.

TABLE 22

BAY AREA HOUSEBUILDERS IN 1949, CLASSIFIED BY NUMBER OF INTEGRATED TRADE CONTRACTOR OPERATIONS AND BY SIZE

Integrated operations	Number of firms by houses built			Total	Per cent of firms in class			
	1–24	25–99	100 and over		1–24	25–99	100 and over	Total
0	1,303	49	15	1,367	84	64	50	82
1	140	19	6	165	9	24	20	10
2	108	9	5	122	7	12	17	8
3 and over	...	..	4	4	..	..	13	[a]
Total	1,551	77	30	1,658	100	100	100	100

[a] Less than one-half of 1 per cent.

TABLE 23

BAY AREA HOUSEBUILDERS IN 1949, CLASSIFIED BY CHANNELS OF MATERIALS DISTRIBUTION AND BY SIZE

Materials channels	Number of firms by houses built				All firms	Per cent of firms in class				
	1–9	10–24	25–99	100 and over		1–9	10–24	25–99	100 and over	All firms
All retail	1,090	117	27	3	1,237	80	62	35	10	75
Some wholesale	272	72	50	27	421	20	38	65	90	25
Total	1,362	189	77	30	1,658	100	100	100	100	100

TABLE 24

BAY AREA HOUSEBUILDERS IN 1949, CLASSIFIED BY AGE OF THE PRINCIPAL AND BY SIZE

Age of the principal in years	Number of firms by houses built				All firms	Per cent of firms in class				
	1–9	10–24	25–99	100 and over		1–9	10–24	25–99	100 and over	All firms
Less than 30 years	74	6	2	..	82	6	3	3	..	5
30–39	437	49	17	3	506	32	26	22	10	31
40–49	372	52	19	10	453	27	27	24	33	27
50–59	298	62	29	14	403	22	33	38	47	24
60 and over	181	20	10	3	214	13	11	13	10	13
Total	1,362	189	77	30	1,658	100	100	100	100	100
Median (in years)	43	48	50	52						

TABLE 25

BAY AREA HOUSEBUILDERS IN 1949, CLASSIFIED BY AGE OF FIRM AND BY SIZE

Age of firm in years	Number of firms by houses built					Per cent of firms in class				
	1–9	10–24	25–99	100 and over	All firms	1–9	10–24	25–99	100 and over	All firms
Less than 5 years	794	85	30	9	918	58	45	39	31	55
5–9	206	63	22	5	296	15	33	28	16	18
10–14	145	13	7	1	166	11	7	9	3	10
15–19	52	6	2	5	66	4	3	4	17	4
20 and over	165	22	15	10	212	12	12	20	33	13
Total	1,362	189	77	30	1,658	100	100	100	100	100
Median (in years)	4	5	6	15						

TABLE 26

BAY AREA HOUSEBUILDERS IN 1949, CLASSIFIED BY YEARS PRINCIPAL WORKED IN BUILDING INDUSTRY BEFORE ESTABLISHMENT OF FIRM, AND BY SIZE

Principal's previous building experience in years	Number of firms by houses built				All firms	Per cent of firms in class				
	1–9	10–24	25–99	100 and over		1–9	10–24	25–99	100 and over	All firms
Less than 1 year	128	46	21	3	198	9	25	27	10	12
1–5	152	35	16	12	215	12	18	20	40	13
6–9	244	15	10	5	274	18	8	13	17	16
10–19	442	31	13	6	492	32	16	18	20	29
20 and over	396	62	17	4	479	29	33	22	13	30
Total	1,362	189	77	30	1,658	100	100	100	100	100
Median (in years)	14	9	6	5						

TABLE 27

BAY AREA HOUSEBUILDERS IN 1949, CLASSIFIED BY TYPE OF OWNERSHIP STRUCTURE AND BY SIZE

Type of ownership	Number of firms by houses built				All firms	Per cent of firms in class				
	1–9	10–24	25–99	100 and over		1–9	10–24	25–99	100 and over	All firms
Proprietorship	904	72	11	..	987	66	38	14	..	60
Partnership	281	50	23	1	355	21	26	30	3	21
Corporation	52	22	5	2	81	4	12	6	7	5
Multifirm combinations	125	45	38	27	235	9	24	50	90	14
Total	1,362	189	77	30	1,658	100	100	100	100	100

TABLE 28

BAY AREA HOUSEBUILDERS IN 1949, CLASSIFIED BY TOTAL ASSETS AND BY SIZE

Total assets (in dollars)	Number of firms by houses built				All firms	Per cent of firms in class				
	1–9	10–24	25–99	100 and over		1–9	10–24	25–99	100 and over	All firms
Less than $40,000	755	45	..	..	800	55	24	..	..	48
40,000–199,000	540	116	32	..	688	39	61	42	..	41
200,000–599,000	61	18	41	7	127	5	9	52	23	8
600,000–999,000	6	3	2	5	16	[a]	2	3	17	1
1,000,000–10,000,000	...	7	2	18[b]	27	..	4	3	60	2
Total	1,362	189	77	30	1,658	100	100	100	100	100
Median ($000)	36.5	88	257	1,080						

[a] Less than one-half of 1 per cent.
[b] 3 firms had more than $5,000,000 in total assets.

TABLE 29

BAY AREA HOUSEBUILDERS IN 1949, CLASSIFIED BY CURRENT ASSETS AND BY SIZE

Current assets (in dollars)	Number of firms by houses built				All firms	Per cent of firms in class				
	1–9	10–24	25–99	100 and over		1–9	10–24	25–99	100 and over	All firms
Less than $20,000	905	46	..	..	951	66	24	..	..	57
20,000–99,000	406	112	27	..	545	30	60	36	..	33
100,000–199,000	39	17	22	3	81	3	9	28	10	5
200,000–499,000	6	10	19	11	46	[a]	5	25	38	3
500,000–5,000,000	6	4	9	16[b]	35	[a]	2	11	52	2
Total	1,362	189	77	30	1,658	100	100	100	100	100
Median ($000)	15.2	42.7	160.0	562.0						

[a] Less than one-half of 1 per cent.
[b] 6 firms had more than $1,000,000 in current assets.

TABLE 30

BAY AREA HOUSEBUILDERS IN 1949, CLASSIFIED BY NET WORTH AND BY SIZE

Net worth (in dollars)	Number of firms by houses built				All firms	Per cent of firms in class				
	1–9	10–24	25–99	100 and over		1–9	10–24	25–99	100 and over	All firms
Less than $20,000	503	32	2	..	537[b]	37	18	2	..	33
20,000–49,000	519	61	7	..	587	38	32	10	..	35
50,000–199,000	325	78	42	9	454	24	41	54	30	27
200,000–499,000	10	14	22	10	56	1	7	29	33	3
500,000–7,500,000	5	4	4	11	24[b]	[a]	2	5	37	2
Total	1,362	189	77	30	1,658	100	100	100	100	100
Median ($000)	30.2	51.8	112.0	419.0						

[a] Less than one-half of 1 per cent.
[b] 14 firms had a net worth less than $5,000, and 7 firms had a net worth more than $1,000,000.

TABLE 31

BAY AREA HOUSEBUILDERS IN 1949, CLASSIFIED BY NET WORTH AS A PER CENT OF SALES VOLUME AND BY SIZE

Net worth as a per cent of sales	Number of firms by houses built				All firms	Per cent of firms in class				
	1–9	10–24	25–99	100 and over		1–9	10–24	25–99	100 and over	All firms
Under 14.9	207	35	19	11	272	15	19	24	37	17
15–34.9	376	95	30	14	515	28	50	39	48	31
35–54.9	316	25	17	3	361	23	13	22	9	22
55–84.9	236	15	9	..	260	17	8	12	..	15
85 and over	227	19	2	2	250	17	10	3	6	15
Total	1,362	189	77	30	1,658	100	100	100	100	100
Median (per cent)	42	25	27	21						

TABLE 32

BAY AREA HOUSEBUILDERS IN 1949, CLASSIFIED BY VALUE OF EQUIPMENT OWNED PER UNIT COMPLETED AND BY SIZE

Value of equipment per unit (in dollars)	Number of firms by houses built				All firms	Per cent of firms in class				
	1–9	10–24	25–99	100 and over		1–9	10–24	25–99	100 and over	All firms
Less than $200	75	54	48	17	194	5	29	62	57	12
200–399	138	67	18	7	230	10	35	23	23	14
400–999	515	51	11	2	579	38	27	15	7	35
1,000–1,999	326	14	..	..	340	24	7	..	..	20
2,000 and more	308	3	..	4	315	23	2	..	13	19
Total	1,362	189	77	30	1,658	100	100	100	100	100
Median ($)	940	320	130	60						

TABLE 33

Bay Area Housebuilders in 1949, Classified by Net Profit and by Size

Net profit (in dollars)	Number of firms by houses built				All firms	Per cent of firms in class				
	1–9	10–24	25–99	100 and over		1–9	10–24	25–99	100 and over	All firms
Loss	152	13	..	..	165	11	7	..	..	10
0–4,900	698	22	3	..	723	51	12	4	..	43
5,000–19,900	439	101	6	..	546	33	53	8	..	33
20,000–49,900	73	53	35	4	165	5	28	45	13	10
50,000–and over	...	..	33	26	59	..	..	43	87	4
Total	1,362	189	77	30	1,658	100	100	100	100	100
Median ($000)	2.8	12	49	150						

TABLE 34

Bay Area Housebuilders in 1949, Classified by Net Profits as a Per Cent of Sales Volume and by Size

Net profit as a per cent of sales	Number of firms by houses built				All firms	Per cent of firms in class				
	1–9	10–24	25–99	100 and over		1–9	10–24	25–99	100 and over	All firms
Loss	152	13	..	..	165	11	7	..	..	10
0–4.9	431	50	6	7	494	31	26	8	23	30
5–9.9	555	67	38	8	668	41	35	49	27	40
10–19.9	178	54	30	12	274	13	29	39	40	17
20–29.9	46	5	3	3	57	4	3	4	10	3
Total	1,362	189	77	30	1,658	100	100	100	100	100
Median (per cent)	5.7	6.7	8.5	10.0						

TABLE 35

Bay Area Housebuilders in 1949, Classified by Net Profits as a Per Cent of Net Worth and by Size

Net profit as a per cent of net worth	Number of firms by houses built				All firms	Per cent of firms in class				
	1–9	10–24	25–99	100 and over		1–9	10–24	25–99	100 and over	All firms
Loss	152	13	..	..	165	11	7	..	..	10
0–9.9	442	37	5	2	496	32	19	6	7	30
10–39.9	504	64	36	11	615	37	34	47	37	37
40–99.9	210	56	25	8	289	16	30	33	26	17
100 and over	54	19	11	9	93	4	10	14	30	6
Total	1,362	189	77	30	1,658	100	100	100	100	100
Median (per cent)	13.1	20.5	23.0	30.4						

TABLE 36

Comparison of Characteristics of One-Family Houses Started in 15 Metropolitan Areas and in the San Francisco Area in the Last Half of 1949

House characteristic	Per cent of all houses: In all 15 areas	Per cent of all houses: San Francisco area	Rank of San Francisco in the 15 areas
Detached	95	96	13
One story	83	91	7
No basement or utility room	32	71	3
Garage	51	96	1
More than one bathroom	11	8	13
Community water supply	94	99	2
Community sewers	75	97	1
Fireplace	28	68	2
Central heating	66	32	11
Floor or wall furnace	24	68	2

House characteristic	Average of all houses: In all 15 areas	Average of all houses: San Francisco area	Rank of San Francisco in the 15 areas
Construction cost, mean	$ 8,500	$ 8,900	6
Purchase price, mean	$10,905	$12,005	4
Number of rooms, median	5	5	2
Floor area (sq. ft.), median	890	1,010	2
Floor area (sq. ft.), mean	[a]	1,072	2
Floor area (sq. ft.)	**Per cent in class**		**Rank**
Less than 800	30	7	15
800–999	35	37	4
1,000–1,199	18	37	1
1,200–1,599	12	13	7
1,600 and over	5	6	6

[a] Not available.
Source: *Construction*, February, 1951, tables 4–17; August, 1951, table 6.

TABLE 37

PER CENT DISTRIBUTION BY PRICE CLASS OF NEW ONE-FAMILY HOUSES COMPLETED IN LAST HALF OF 1949 IN BAY AREA

	Purchase price class, dollars							Median	Arithmetic Mean
	Less than 8,500	8,500–9,499	9,500–10,499	10,500–12,499	12,500–14,499	14,500–18,499	18,500 and over		
Per cent of houses.	19	17	12	21	7	12	12	$10,600	$12,005

SOURCE: "Sales Prices and Financing of New Homes in Four Western Metropolitan Areas"—U. S. Bureau of Labor Statistics, Western Region.

TABLE 38

CHARACTERISTICS OF ONE-FAMILY HOUSES STARTED IN THE SAN FRANCISCO AREA IN THE LAST HALF OF 1949 CLASSIFIED ACCORDING TO SIZE OF BUILDER

Characteristic	Per cent of houses having characteristic by size class of builder					
	1–9	10–24	25–99	100 and over	Non-professionals	All houses
No basement or utility room	53	63	82	71	71	71
Stucco exterior	37	56	58	49	29	43
Dry wall construction	66	81	70	91	76	83
Central heat	37	37	32	27	25	32
More than one full bath	24	9	6	1	5	8
More than 1,500 square feet	24	3	5	1	14	10
Median size (in square feet)	1,070	1,033	974	1,002	950	1,010

TABLE 39

HOUSES CONSTRUCTED BY BAY AREA BUILDERS IN 1949, CLASSIFIED BY PRICE CLASS AND BY SIZE OF FIRM

Price classes (in dollars)	Number of houses by size class of builder				All houses	Per cent of houses in class				
	1–9	10–24	25–99	100 and over		1–9	10–24	25–99	100 and over	All houses
Less than $9,000	517	264	963	2,904	4,648	11	9	27	47	27
9,000–10,999	1,328	1,048	1,041	1,499	4,907	27	36	30	24	27
11,000–12,999	554	528	549	1,148	2,779	11	18	16	19	16
13,000–14,999	533	508	330	388	1,759	11	17	9	6	10
15,000 and over	1,910	588	629	265	3,392	40	20	18	4	20
Total	4,842	2,936	3,512	6,195	17,485	100	100	100	100	100

TABLE 40

SELECTED MORTGAGE CHARACTERISTICS OF MORTGAGED HOUSES COMPLETED IN LAST HALF OF 1949, IN 15 METROPOLITAN AREAS AND SAN FRANCISCO AREA[a]

Mortgage characteristic[b]	In all 15 areas	San Francisco area	Source of first mortgage	Per cent of total: In all 15 areas	Per cent of total: San Francisco area	Type of financing	Per cent of total: In all 15 areas	Per cent of total: San Francisco area
Amount	$8,410	$8,970	Mortgage company	31	9	VA guaranteed	19	2
Duration in years	22.0	22.0	Bank	37	57	FHA–VA combination	33	47
Initial equity	$2,220	$2,730	Savings and loan associations	15	4	FHA insured	23	27
Monthly mortgage payment	$52.50	$58.35	Insurance company	10	21	Uninsured	18	15
No down payment	25%	8%	Individuals	3	2	Unmortgaged	7	9

[a] Does not include nonprofessionally built.
[b] Based on arithmetic means.
SOURCE: "Purchasers' Incomes and New-home Financing," *Monthly Labor Review*, July, 1951, (R.2051), and *Construction*, February, 1951, table 17.

TABLE 41

FINANACIAL DATA CLASSIFIED BY INCOME GROUP OF PURCHASER IN LAST HALF OF 1949 FOR 15 METROPOLITAN AREAS AND SAN FRANCISCO AREA

Income group of purchaser	Per cent of buyers in group		Average price paid by group		Per cent in group using mortgage		Average per cent of price covered by mortgage		Ratio of mortgage to income		Ratio of mortgage payment to income		Per cent of all families in income group	
	In all 15 areas	San Francisco area	In all 15 areas	San Francisco area	In all 15 areas	San Francisco area	In all 15 areas	San Francisco area	In all 15 areas	San Francisco area	In all 15 areas	San Francisco area	In all 15 areas	San Francisco area
Less than $2,000	2	2	$9,525	$10,455	66	..	63	..	..	..	..	..	18	14
2,000–2,999	12	5	8,560	9,390	95	76	86	82	2.9	2.8	0.22	0.23	14	14
3,000–3,999	36	33	9,240	10,155	97	93	87	88	2.3	2.4	0.17	0.18	22	25
4,000–4,999	23	26	10,570	11,455	96	91	81	81	1.9	2.0	0.14	0.15	16	17
5,000–5,999	13	14	12,115	12,670	93	95	75	73	1.6	1.7	0.13	0.13	11	11
6,000–7,499	6	8	13,935	17,445	95	91	69	60	1.4	1.5	0.11	0.12	8	9
7,500–9,999	3	6	16,385	15,715	78	77	68	67	1.3	1.2	0.10	0.09	6	4
10,000 and over	4	3	22,985	20,365	70	88	57	61	...	...	....	....	5	4
All	100	100	10,905	12,005	94	91	79	77	...	...	....	....	100	100

SOURCE: "Purchasers' Incomes and New-home Financing," *Monthly Labor Review*, July 1951, (R. 2051); Bureau of Census: *1950 Census of Population*, Series PC-5.

TABLE 42

ESTIMATES OF NUMBER OF BAY AREA TRADE CONTRACTORS IN 1949 WITH HOUSEBUILDING SPECIALTIES

Type of Contractor	Licenses		Active firms	
	Number	Per cent active	Number	Per cent of all active
Painting	1,720	71.6	1,232	35
Plumbing	544	77.7	423	12
Flooring (wood)	168	73.0	123	4
Cement and concrete	164	70.5	116	3
Masonry	152	78.5	119	3
All others	2,036	74.9	1,525	43
Total	4,784	74.0	3,538	100

TABLE 43

BAY AREA TRADE CONTRACTORS IN 1949, CLASSIFIED BY DOLLAR VOLUME AND BY TRADE

Type of contractor	Number of firms in trade	Per cent of firms performing total work of a value				
		\$0–9,999	\$10,000–49,999	\$50,000–199,999	\$200,000–499,999	\$500,000 and over
Painting	1,232	50	36	10	4	[b]
Plumbing	423	28	27	33	5	7
Flooring (wood)	123	19	63	4	14	[a]
Cement and concrete	116	24	33	27	8	8
Masonry	119	6	54	25	15	[a]
All others	1,525	19	44	22	10	5
Total	3,538	31	40	19	7	3

[a] Included in previous class because number is so few that confidential information might otherwise be divulged.
[b] Less than one-half of 1 per cent.

TABLE 44

Bay Area Trade Contractors in 1949, Classified by Average Number of Site Employees and by Trade

Type of contractor	Number of firms in trade	Per cent of firms with number of employees				
		Owner only	1–4	5–9	10–24	25 and over
Painting	1,232	31	44	13	4	8
Plumbing	423	17	43	20	10	10
Flooring (wood)	123	19	51	14	9	7
Cement and concrete	116	20	47	8	13	12
Masonry	119	9	31	30	24	6
All others	1,525	16	43	18	14	9
Total	3,538	22	44	16	10	8

TABLE 45

Bay Area Trade Contractors in 1949, Classified by Average Number of Overhead Personnel and by Trade

Type of contractor	Number of firms in trade	Per cent of firms with number of off-site personnel			
		Owner in spare time	Owner only	2–4	5 and over
Painting	1,232	81	5	10	3
Plumbing	423	47	25	19	8
Flooring (wood)	123	77	9	1	13
Cement and concrete	116	68	10	13	9
Masonry	119	69	15	15	1
All others	1,525	65	15	12	8
Total	3,538	70	12	12	6

TABLE 46

BAY AREA TRADE CONTRACTORS IN 1949, CLASSIFIED BY PER CENT WORK ON NEW HOUSING FORMED OF TOTAL VOLUME AND BY TRADE

Type of contractor	Number of firms in trade	Per cent of firms performing new housing equal to per cent of total volume				
		0–9	10–39	40–69	70–89	90–100
Painting	1,232	60	16	12	2	10
Plumbing	423	37	15	28	11	9
Flooring (wood)	123	13	34	13	12	28
Cement and concrete	116	29	21	28	9	13
Masonry	119	16	7	15	20	42
All others	1,525	24	19	21	13	23
Total	3,538	38	18	18	9	17

TABLE 47

BAY AREA TRADE CONTRACTORS IN 1949, CLASSIFIED BY PER CENT NEW HOUSING FORMED OF TOTAL PRODUCTION, BY TRADE, AND BY SIZE

Size class (in dollars)	Percentage distribution of firms in each size class											
	Cement and concrete, Per cent of work on new housing				Masonry, Per cent of work on new housing				Plumbing, Per cent of work on new housing			
	0–9	10–69	70–89	90–100	0–9	10–69	70–89	90–100	0–9	10–69	70–89	90–100
$ 0–9,999	78	22	..	..	50	..	50	..	63	37	..	..
10,000–49,999	17	43	20	20	..	12	26	62	24	46	11	19
50,000–199,999	3	72	3	22	7	56	20	17	24	52	17	7
200,000–499,999	..	67	33	..	89	11	..	..	61	28	6	5
500,000[a] and over	75	25	..	..	..	..	..	..	41	22	34	3
Total	30	47	10	13	17	22	21	40	37	43	12	8

[a] Masonry firms of this size are included in previous class so that confidential information may not be divulged.

TABLE 48

BAY AREA TRADE CONTRACTORS IN 1949, CLASSIFIED BY NUMBER OF AREAS WORKED IN AND BY TRADE

Type of contractor	Number of firms in trade	Per cent of firms working in number of areas				
		1 county	2–3 counties	4–6 counties	Rest of bay area	Outside area
Painting	1,232	48	39	1	5	7
Plumbing	423	66	20	3	4	7
Flooring (wood)	123	22	49	..	19	10
Cement and concrete	116	41	32	8	14	5
Masonry	119	20	44	5	10	21
All others	1,525	37	36	4	12	11
Total	3,538	43	36	3	9	9

TABLE 49

Costs of the Composite House Classified by Main Expenditures and by Size of Builder

Expenditures	Size of builder (in dollars)			Size of builder (per cent of total)		
	Small	Medium	Large	Small	Medium	Large
Direct labor	1,485	1,300	1,100	16	14	13
Direct materials	2,235	1,925	1,825	24	21	21
Subcontracts						
Plumbing	889	765	640	9	8	7
Painting	626	587	537	7	6	6
Flooring	396	370	343	4	4	4
Cement and concrete	314	285	259	3	3	3
Masonry	235	205	180	2	2	2
Sheet metal and heating	225	212	175	2	2	2
Electric wiring and fixtures	220	207	180	2	2	2
Ceramic tile	180	141	130	2	2	1
Roofing	174	168	148	2	2	2
Grading	52	33	19	1	[a]	[a]
Linoleum	35	31	24	[a]	[a]	[a]
Shades and blinds	33	27	22	[a]	[a]	[a]
Subtotal subcontracts	3,379	3,031	2,657	35	33	30
Incidentals	410	410	310	4	4	4
Land	1,250	1,250	1,250	13	14	14
Overhead and profit	741	1,334	1,608	8	14	18
Total cost	9,500	9,250	8,750	100	100	100

[a] Less than one-half of 1 per cent.

TABLE 50

LABOR COSTS OF THE COMPOSITE HOUSE BY CONTRACTOR AND TRADE, AND BY SIZE OF BUILDER

Contractor and trade	Size of builder			Size of builder			Size of builder		
	Small	Medium	Large	Small	Medium	Large	Small	Medium	Large
	(In dollars)			Per cent of total labor cost			Per cent of total cost of house		
Direct Labor									
Carpenter	1,266	1,101	909	48	48	44	14	12	11
Laborer	219	199	191	8	8	11	2	2	2
Subtotal direct	1,485	1,300	1,100	56	56	55	16	14	13
Trade contractors									
Painting (painters)	360	338	322	14	15	16	4	3	4
Plumbing (plumbers)	194	167	159	7	7	8	2	2	2
Flooring (carpenters)	106	93	88	4	4	4	1	1	1
Masonry (masons)	100	72	72	4	3	4	1	1	1
Tile (masons)	88	59	51	3	3	2	1	1	1
Wiring (electricians)	80	74	66	3	3	3	1	1	1
Sheet metal and heating (sheet metal)	60	55	50	2	2	2	1	1	1
Cement and concrete (cement finishers)	50	43	39	2	2	2	1	[a]	[a]
(laborers)	41	41	41	1	2	2	[a]	[a]	[a]
Roofing (roofers)	42	40	37	2	2	2	[a]	[a]	[a]
Grading (excavators)	18	9	5	1	[a]	[a]	[a]	[a]	[a]
Linoleum (painters)	15	12	9	1	1	[a]	[a]	[a]	[a]
Other labor	7	7	5	[a]	[a]	[a]	[a]	[a]	[a]
Subtotal subcontracts	1,161	1,010	944	44	44	45	12	11	11
Total	2,646	2,310	2,044	100	100	100	28	25	24

[a] Less than one-half of 1 per cent.

TABLE 51

MATERIALS COSTS OF THE COMPOSITE HOUSE BY CONTRACTOR AND BY SIZE OF BUILDER

Material	Size of builder			Size of builder			Size of builder		
	Small	Medium	Large	Small	Medium	Large	Small	Medium	Large
	(In dollars)			Per cent of total material cost			Per cent of total cost of house		
Direct									
Lumber	1,085	970	970	29	29	31	11	11	11
Millwork	725	580	510	19	17	16	8	6	6
Gypsum board	240	220	205	6	7	7	3	2	2
Hardware	185	155	140	5	5	5	2	2	2
Subtotal direct	2,235	1,925	1,825	59	58	59	24	21	21
Trade contractors									
Plumbing	495	450	405	13	13	13	5	5	5
Flooring (oak)	224	198	185	6	6	6	2	2	2
Concrete	179	168	153	5	5	5	2	2	2
Paint	144	135	108	4	4	4	2	1	1
Sheet metal	113	113	97	3	3	3	1	1	1
Roofing	99	99	87	3	3	3	1	1	1
Electrical	96	96	83	3	3	3	1	1	1
Masonry	80	80	63	2	2	2	1	1	1
Ceramic tiles	61	60	59	2	2	2	1	1	1
Shades	19	14	14	[a]	[a]	[a]	[a]	[a]	[a]
Linoleum	14	14	11	[a]	[a]	[a]	[a]	[a]	[a]
Subtotal trade contractors	1,524	1,427	1,265	41	42	41	16	16	14
Total	3,759	3,352	3,090	100	100	100	40	37	35

[a] Less than one-half of 1 per cent.

TABLE 52

OVERHEAD AND PROFIT ON SITE WORK OF THE COMPOSITE HOUSE, BY CONTRACTOR AND BY SIZE OF BUILDER

Contractor	Size of builder			Size of builder			Size of builder		
	Small	Medium	Large	Small	Medium	Large	Small	Medium	Large
	(In dollars)			Per cent of all overhead and profit			Per cent of total cost of house		
Builder	741	1,334	1,608	52	69	78	8	14	18
Trade contractors									
Plumbing	200	148	76	14	8	4	2	2	1
Painting	122	114	107	9	6	5	1	1	1
Flooring	66	79	70	5	4	3	1	1	1
Cement and concrete	44	33	26	3	2	1	[a]	[a]	[a]
Masonry	55	53	45	4	3	2	1	1	1
Sheet metal	52	44	28	4	2	1	1	[a]	[a]
Electrical	44	37	31	3	2	2	[a]	[a]	[a]
Ceramic tile	31	22	20	2	1	1	[a]	[a]	[a]
Roofing	33	29	24	2	2	1	[a]	[a]	[a]
Grading	34	24	14	2	1	1	[a]	[a]	[a]
Linoleum	6	5	4	[a]	[a]	[a]	[a]	[a]	[a]
Shades and blinds	7	6	3	[a]	[a]	[a]	[a]	[a]	[a]
Subtotal trade contractors	694	594	448	48	31	22	7	6	5
Total	1,435	1,928	2,056	100	100	100	15	20	23

[a] Less than one-half of 1 per cent.

TABLE 53

CONCENTRATION RATIOS IN 1947 OF INDUSTRIES MANUFACTURING BUILDING MATERIALS

Material	Industry	Classification number	Number of firms	Concentration ratio—per cent of output supplied by: 4 firms	8 firms	20 firms	50 firms	Relative importance: By material in Bay area[a] house (in per cent)	By value of shipments in 1947 (in per cent)
Lumber and flooring	Saw and planing mills	2,421	19,223	5.4	7.2	11.0	17.9	34.1	14.1
Millwork	Millwork plants	2,431	2,276	7.4	13.0	23.8	38.8	13.3	2.9
Cabinets	Plywood plants	2,432	142	21.9	33.6	55.7	83.4	5.4	1.4
Gypsum products	Gypsum products	3,272	33	84.6	94.1	99.7	100.0	6.4	0.7
Hardware									
Nails and spikes	Fabricated wire products	3,481	63	39.6	59.6	85.6	99.3	1.9	0.2
Rods	Steel works and rolling mills	3,312	111	44.7	62.8	81.1	94.2	1.3	12.7
Finish	Hardware, n.e.c.	3,429	717	28.5	39.9	52.7	69.8	1.9	3.2
Building paper	Paper and board mills	2,616	453	15.6	23.7	36.5	56.4	0.7	15.7
Plumbing									
Metal plumbing fixtures and fittings	Metal plumbing fixtures	3,431	263	34.7	48.3	67.9	85.7	5.3	1.6
Vitreous plumbing fixtures	Vitreous plumbing fixtures	3,261	26	57.9	81.7	99.6	100.0	1.9	0.4
Pipe, cast iron	Gray iron foundries	3,321	1,554	16.3	23.6	35.3	48.1	2.1	6.5
Water pipe, galvanized steel	Steelworks and rolling mills[c]	3,312	111	44.7	62.8	81.1	94.2	2.6	12.7
Concrete									
Cement, hydraulic	Cement,[c] hydraulic	3,241	73	29.5	45.1	70.0	93.3	2.4	2.3
Aggregates[b]	.....	.....	.....	....	....	....	....	2.4	....
Paint	Paints and varnishes	2,851	1,154	27.3	35.7	48.2	60.9	3.8	6.9
Sheet metal	Sheet metal work[c]	3,444	1,665	20.5	28.5	37.8	48.3	1.2	2.4
Roofing, asphalt	Roofing felts and coatings	2,952	104	41.7	64.8	87.3	98.7	2.4	1.9

Electrical									
Wiring	Insulated wire and cable[c]	3,631	150	40.7	57.4	80.5	95.6	1.1	1.7
Lighting fixtures	Lighting fixtures[c]	3,471	1,198	18.1	25.8	38.6	55.0	1.5	2.6
Masonry, red brick	Brick and hollow tile[c]	3,251	574	9.7	16.6	29.8	46.5	2.1	0.8
Ceramic tile	Floor and wall tile	3,253	34	50.9	70.3	96.4	100.0	1.6	0.2
Window shades	Window shades	2,562	103	71.7	83.4	93.0	98.3	0.5	0.4
Linoleum	Hard surface floor coverings	2,274	14	80.3	94.5	100.0	100.0	0.4	1.0
Window glass	Flat glass	3,211	15	88.1	98.5	100.0	100.0	0.6	1.4
Heating									
Furnace and water heater	Heating and cooking apparatus except electric[c]	3,439	792	11.7	20.2	37.1	57.4	3.1	6.3
Total	.....	.....	.....	.....	.....	.....	.....	100.0	100.0

[a] Total value of materials in San Francisco Bay Area House is \$3,759.00.
[b] Concentration ratio not available.
[c] Nonhomogeneous.
SOURCE: "Study of Monopoly Power," *Hearings*, Subcommittee on Study of Monopoly Power, U. S. House Committee on The Judiciary (81:2), p. 1437 ff.

TABLE 54

Distribution of Housebuilding Materials by Concentration Ratio Classes, 1947, Based on Use of Materials in Composite Bay Area House

Concentration ratio first 8 companies	Homogeneous industries[a]		All industries[b]	
	Per cent	Cumulative per cent	Per cent	Cumulative per cent
0.1–10	40.8	40.8	35.0	35.0
10.1–20	15.9	56.7	13.6	48.6
20.1–30	3.4	60.1	2.9	51.5
30.1–40	13.2	73.3	11.3	62.8
40.1–50	6.3	79.6	5.4	68.2
50.1–60	2.4	82.0	2.0	70.2
60.1–70	4.5	86.5	3.8	74.0
70.1–80	1.9	88.4	1.7	75.7
80.1–90	2.8	91.2	2.4	78.1
90.1–100	8.8	100.0	7.6	85.7
Nonhomogeneous	....	....	14.3	100.0
Total	100.0	100.0	100.0	100.0

[a] Calculated from material values totaling $3,145.00; the value of all materials in the composite house equal $3,759.00.

[b] Calculated from material values totaling $3,669.00 for which concentration ratios were available; the value of all materials in the composite house equals $3,759.00.

TABLE 55

Distribution of Housebuilding Materials by Concentration Ratio Classes, 1947, Based on Value of Products of Materials Supply Industries

Concentration ratio first 8 companies	Homogeneous industries[a]		All industries[b]	
	Per cent	Cumulative per cent	Per cent	Cumulative per cent
0.1–10	19.9	19.9	14.1	14.1
10.1–20	4.1	24.0	2.9	17.0
20.1–30	31.4	55.4	22.2	39.2
30.1–40	16.4	71.8	11.6	50.8
40.1–50	2.3	74.1	1.6	52.4
50.1–60	.2	74.3	0.1	52.5
60.1–70	20.5	94.8	14.6	67.1
70.1–80	.3	95.1	0.2	67.3
80.1–90	.6	95.7	0.4	67.7
90.1–100	4.3	100.0	3.4	71.1
Nonhomogeneous	....	....	28.9	100.0
Total	100.0	100.0	100.0	100.0

[a] Calculated from value of products shipped of $12,783,440,000.

[b] Calculated from value of products shipped of $17,946,824,000 which includes all industries supplying materials for the composite house, except Aggregates, for which no data are available.

TABLE 56

REVISED WHOLESALE PRICE INDEX AND BUILDING MATERIALS PRICE INDEXES

Year	All commodities	All commodities other than farm products and food	Building materials[a]	Lumber[a]
1929	61.9	65.5	51.4	32.1
1930	56.1	60.9	48.2	29.3
1931	47.4	53.6	43.1	23.8
1932	42.1	50.2	38.7	20.0
1933	42.8	50.9	41.6	24.2
1934	48.7	56.0	46.2	28.9
1935	52.0	55.7	45.6	27.7
1936	52.5	56.9	46.9	28.9
1937	56.1	61.0	52.2	34.1
1938	51.1	58.4	49.8	30.9
1939	50.1	58.1	49.8	31.9
1940	51.1	59.4	51.5	35.2
1941	56.8	63.7	55.4	41.9
1942	64.2	68.3	58.7	45.4
1943	67.0	69.3	59.0	47.3
1944	67.6	70.4	61.4	52.2
1945	68.8	71.3	62.4	53.0
1946	78.7	78.3	69.8	61.0
1947	96.4	95.3	94.0	94.5
1948	104.4	103.4	104.0	107.3
1949	99.2	101.3	102.0	98.2
1950	103.1	105.0	109.5	114.5
1951	114.8	115.9	119.6	123.6

[a] Years 1929–1945 calculated by linking old BLS wholesale price relatives of major classes to 1947–1949 = 100, and using new class weights prevailing in 1947.
SOURCE: Bureau of Labor Statistics, U. S. Department of Labor.

TABLE 57

CONSTRUCTION EMPLOYMENT IN 1940 AND 1950 FOR UNITED STATES, CALIFORNIA, AND SAN FRANCISCO METROPOLITAN AREA[a]

Area	Employment (in thousands)		Per cent increase		Per cent of employed labor force	
	1940	1950	1940	1950	1940	1950
United States	2,056.3	3,480.0	.....	69.3	4.6	6.2
California	151.9	316.0	.....	108.1	6.1	8.1
San Francisco	33.1	68.1	.....	105.9	6.0	8.0

[a] Includes employers, own-account workers, and so on.
SOURCE: Bureau of the Census; 1950 Census: Series PC-5, No. 45; PC-6, No. 1; PC-7, No. 2.

TABLE 58

Average Earnings and Average Hours Worked, for Building and All Manufacturing Employees, in United States and California, Selected Years

Year and area	Building general contractors[a]			Building trade contractors[a]			All manufacturing industries		
	Earnings (in dollars)		Hours worked per week	Earnings (in dollars)		Hours worked per week	Earnings (in dollars)		Hours worked per week
	Weekly	Hourly		Weekly	Hourly		Weekly	Hourly	
United States									
1940	30.56	0.92	33.3	33.11	1.01	32.7	25.20	0.66	38.1
1946	53.33	1.42	37.6	59.52	1.54	38.6	43.82	1.09	40.4
1950	68.56	1.92	35.8	77.77	2.12	36.7	59.33	1.47	40.5
California									
1950	73.05	2.21	36.4	85.51	2.41	35.5	65.39	1.65	39.7

Indexes 1940=100

Year and area	Building general contractors[a]			Building trade contractors[a]			All manufacturing industries		
	Earnings		Hours of work	Earnings		Hours of work	Earnings		Hours of work
	Weekly	Hourly		Weekly	Hourly		Weekly	Hourly	
United States									
1940	100	100	100	100	100	100	100	100	100
1946	175	155	113	180	153	118	174	164	106
1950	224	209	108	235	209	112	235	222	106

[a] In private building.

Source: U. S. Bureau of Labor Statistics, *Handbook of Labor Statistics, 1947, 1950;* California Department of Industrial Relations, *Handbook of California Labor Statistics, 1949–1950.*

TABLE 59

NUMBER OF WORK STOPPAGES AND MAN-DAYS IDLE, 1946–1950, UNITED STATES AND CALIFORNIA

Year and area	Work stoppages			Man-days idle		
				(in thousands)		Construction per cent of total
	Total all industries	Construction	Construction per cent of total	Total all industries	Construction	
United States:						
1946	4,985	351	7.0	116,000	1,450	1.3
1947	3,693	382	10.3	34,600	2,770	8.0
1948	3,419	380	11.1	34,100	1,430	4.2
1949	3,606	615	17.1	50,500	2,760	5.5
1950	4,843	611	12.6	38,800	2,460	6.3
California:						
1946	246	19	7.7	6,082	29	0.5
1947	247	18	7.3	2,440	42	1.7
1948	178	27	15.1	2,790	72	2.6
1949	217	43	19.7	2,040	109	5.3
1950	238	38	16.0	1,630	668	41.0

SOURCE: Bureau of Labor Statistics, *Handbook of Labor Statistics;* California Department of Industrial Relations, *Handbook of California Labor Statistics, 1949, 1950.*

TABLE 60

COMPARATIVE PROFIT RATES BASED ON TOTAL SALES,[a] CONSTRUCTION, AND OTHER INDUSTRIES

Industry classification	Net income as a per cent of sales volume in year:									
	1929	1932	1938	1940	1943	1945	1947	1948	1949	1950
Construction	4.3	− 6.8	1.5	2.8	5.7	3.3	5.6	6.3	6.9	6.8
All industries	7.1	− 4.4	3.1	6.9	10.7	8.2	8.8	8.7	7.7	9.8
All manufacturing industries	7.2	− 4.2	3.2	8.5	10.3	7.5	9.8	9.7	8.2	11.1
Machinery (except electrical and transportation)	11.3	−15.5	6.7	15.1	14.1	9.1	11.7	12.2	10.8	13.4
Automobiles and equipment	7.7	−13.6	2.2	11.5	8.9	5.7	11.0	12.3	13.9	17.7
Furniture and finished lumber products	3.1	−16.9	1.2	5.1	7.3	7.0	8.4	7.0	4.5	6.8
San Francisco Bay area housebuilding	....	......	....	....	....	....	....	....	8.5[b]	....

[a] Total sales of corporations are used since gross income of corporations for all above years is not available.
[b] Profit rate for medium size builders, see table 34.
SOURCE: National Income Supplement to *Survey of Current Business.* The profit rate is the ratio of corporate income before taxes to corporate sales.

TABLE 61

NET PROFIT AS A PER CENT OF NET WORTH, IN SELECTED INDUSTRIES AND YEARS

Industry classification	Profit as a per cent of owners' equity			
	1947	1948	1949	1950
Bay Area housebuilding	[a]	[a]	23.0	[a]
All manufacturing industries	25.5	25.6	18.5	27.8
Machinery (except electrical and transportation)	26.4	27.3	19.3	25.8
Motor vehicles and parts	29.2	34.7	37.6	52.9
Furniture and fixtures	30.5	26.8	14.6	26.9

[a] Not available.

SOURCE: Securities Exchange Commission–Federal Trade Commission: *Quarterly Industrial Financial Report Series for All U. S. Manufacturing Corporations*. Bay Area data based on table 35 of this report. The profit rates are before federal income taxes.

TABLE 62

Rates of Net Growth, Entry, and Discontinuance, for Selected Industries, Areas, and Years

Area and industry	Percentage rates of change of industry populations					
	1945	1946	1947	1948	1949	1950
	Net growth rate					
Bay Area						
Contract construction	[a]	[a]	[a]	14.9	0.5	5.7[b]
Building contractors	[a]	[a]	[a]	22.2	1.1	6.5[b]
Special trade contractors	[a]	[a]	[a]	11.4	0.3	3.9[b]
United States						
Contract construction	22.5	29.9	13.5	6.3	3.5	8.3
All manufacturing industries	8.3	16.3	2.7	− 3.0	− 6.6	− 2.0
All industries	7.1	11.2	4.7	0.5	− 0.7	1.0
	Entry rate					
United States						
Contract construction	33.2	41.5	26.5	20.7	17.6	20.4
All manufacturing industries	18.6	26.3	15.1	12.1	10.1	12.2
All industries	13.4	17.6	12.3	9.9	9.0	10.0
	Discontinuance rate					
United States						
Contract construction	10.7	11.6	13.0	14.4	14.1	12.1
All manufacturing industries	10.3	10.0	12.4	15.1	16.7	14.2
All industries	6.3	6.4	7.6	9.4	9.7	9.0

[a] Not available.
[b] Preliminary.
Source: National data: *Survey of Current Business*, May, 1950, pp. 12–20, and "Business Statistics," 1951. Bay Area data: *California Employment and Payrolls*, State of California, Department of Employment. Bay Area data are based on changes in average number from previous year; national data are based on changes from March 31 to March 31.

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